

# **VALUING TEACHER QUESTIONING**

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## **PREFACE**

The value of emphasis on teachers' questions lies in the prominence of their usage as the basic tool employed in most of the methods of classroom teaching. Though questioning provides a partial view of teacher's observable verbal behaviour, it gains significance, in teacher dominated traditional classroom teaching. Apart from pedagogic function, questioning also performs an important psychological function of motivating students to think critically and reflectively which in turn accelerates the learning process. It is also felt that teachers in the Indian context can capitalize on the use of questioning especially in large classes to make teaching-learning participatory and interactive.

It is in this context a project on-"Teacher Questioning in Classroom-Development of Resource Material" was undertaken in the department. The programme aimed to explore the role of questioning as a teaching device and develop resource material for teachers. It was proposed that the development of material would be based on extensive review of research, examination of existing practices in classroom besides studying the status of elementary teacher educators' understanding of classroom questioning. This monograph is the outcome of research and development work undertaken in the above mentioned project. It is hoped, this material will provide





guidelines to practising as well as prospective teachers and help in broadening teachers' professional repertoire of teaching strategies and create an understanding of the application of this technique in classroom.

I am indebted to Prof. M.K. Raina, Head, Department of Educational Psychology and Foundations of Education under whose guidance the framework of the project proposal was developed during the initial stages. Prof. Raina's constant guidance and incisive review of the project from time to time, helped to give final shape to this material. My grateful thanks to resource persons of the review workshop : Prof. S.N. Tripathi, Prof. B.N. Puhan, Dr. Ajit Singh, Dr. Girish Chaudhary, Dr. Poonam Batra and Dr. Pratibha Sharma for giving critical feedback and suggestions for the improvement of this material. I am grateful to Mrs. Shefali Ray for reviewing the material from the language point of view. I would like to thank Ms. Manpreet Kaur project fellow, for assisting in data collection and analyses in the beginning of the project. My thanks are due also to Ms. Tanvi Rishi project fellow for providing assistance in preparing of some initial drafts, documentation and proof-reading during the final stages of the project.



# I

## INTRODUCTION

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*"Given the fact that teachers will have no time in the foreseeable future, can we encourage students to be more self-reliant? Can they find answers to their questions themselves? Just as finding a hidden person in a hide and seek game brings pleasure, so can searching and finding the answer to your question."*

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*(Narlikar, 2000)*

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Questioning has been a way of learning as well as teaching, long before the different systems of formal education were established. Asking questions represents a traditional and predominant teaching technique and is one of the basic ways by which the teacher stimulates students' thinking and learning. It continues to be the most usable technique for teachers to gather information on students' grasp of the new materials as also of previous learning. The role of questioning cannot be over-emphasised in getting students to think critically, analytically, rigorously, and effectively. Effective questioning can facilitate desirable attitudes, develop and sustain interests, provide new ways of dealing with the subject matter, and impart purpose to student-teacher interaction. This enhances the prospects for effective and affective development of children.

Use of questioning as a teaching technique by teachers helps to make teaching more participative and interactive. Questioning is



an integral part of experiential learning and provides for interchange of ideas and stimulation of thought. Hence, questioning is a potent device which, if used effectively by the teacher, can help to develop the needed competencies in students, and to get immediate feedback on students' learning. It reinforces students' learning, provides experience of success which ultimately develops positive self-concept, in turn, promotes learning which leads to better achievement. All these together would improve the quality of instruction in classroom. Since questioning is an effective technique of students' involvement in the teaching learning process, it would be particularly beneficial in the Indian context to meet the needs of large classes and multigrade teaching.

Recent developments in education have placed much emphasis on helping children to learn how to learn, to become independent in their learning, and to think for themselves. One of the teacher's most effective instruments for stimulating and guiding this initiative is the question. In order to make children independent in their learning, they too must learn how to question. Questioning generates the kind of communication, which can lead to new learning; reveal to the teacher the readiness of students for the new lesson; and establish a more conducive and productive climate in the classroom. The nature of this discourse directs and shapes the quality of learning and helps students become its active participants. To enable elementary school children to be successful in their learning, the teacher therefore, must be able to create a mental set, initiate the process of learning, sustain



students' attention on the task, diagnose difficulties, provide direction and purpose to the student's learning. One of the most effective agents for accomplishing these purposes is the question.

In Piaget's (1954, 1964, 1970a,b) view, learning is a continuous process and children learn by interacting with the environment. According to Piaget, a child needs to be made aware of the discrepancies and inconsistencies in his growing consciousness of his world, the cognitive dissonance thus created spurs him on to make sense of his experiences and attain a more complex stage of thought. Cognitive conflict can be seen as a kind of intrinsic motivation, provided the children recognize the existence of such ambiguities. Teaching methods therefore need to be geared to the stage of the conceptual development of the student. The role of the teacher, therefore is to organise the subject matter in a manner that provides learning activities which pose a challenge to the students (Inhelder and Piaget, 1958). Piaget's 'clinical interview method' made use of open-ended questions to discover the child's world view (Ginsburg, 1997, p.49). Use of such questions, in fact, places the child's thought in the context of emotion, value, and character and caters for the functioning of the whole child (Ginsburg, 1997). According to Vygotsky (1978) social context acts as a facilitator to the child's "level of potential development" (p.86). Vygotsky suggested providing adult assistance in different question forms like probing, hints, counter suggestion or even simple rephrasing of a question. Questioning is thus at a premium since this can reveal to a child an inherent conflict in his own





argument. Judicious questioning serves to orient the child towards inconsistencies in his own thinking or phenomena that might otherwise be overlooked or even taken for granted. This kind of questioning views the child as an active learner in the process of learning. Effective questioning can thus vitalize the teaching learning transaction by encouraging children to find creative ways to find answers and construct knowledge for themselves.

Research too has confirmed and elucidated the importance of teacher questions in focusing and challenging learning tasks for effective teaching. It may be stated that style of questioning is an indicator of teaching-learning approaches and the types of questions asked indicate the cognitive demands the teacher makes on the students. Thus, questioning provides the answer to the issue of how to match the task to the pupils' level of knowledge and thinking. Keeping in view that good classroom questioning is intimately connected with the use of relevant quality questions, there is a need to emphasize the importance of questioning skill as a means of stimulating and guiding the thinking of children.

However, it is also observed that in the Indian educational system the teacher dictates the thought and works of the students, allowing no questioning (Rao, 1995) where the schools merely teach children to imitate (Menon, 1997, p.13). The emphasis is on rote learning, which serves to numb all critical and creative faculties. The impact is so deep-rooted that students rarely ask questions, not to speak of the incisive questions (Raina & Srivastava, 2000). Narlikar



(2000) opined that, questions by students are discouraged for several reasons, one of them being the teacher's inability to handle the question (p.14).

Against this background, a need to prepare resource material for developing questioning skills in teachers has been felt. This material is based on the present status of research knowledge on teacher questioning, a survey on the existing practices in Indian classrooms and an analysis of the status of elementary teacher educators' understanding of classroom questioning. It is expected that this material would help in broadening the professional repertoire of teachers' and teacher educators' and create awareness and understanding of the application of this technique in the classroom. The reading material focuses on :

- importance of questioning in the classroom and its role in active learning,
- the significance of questioning in relation to Piagetian stages of development,
- the use of research knowledge for effective questioning in the classroom,
- different ways in which questions have been classified,
- building questioning skills for teachers, suggesting techniques for posing questions and dealing with answers, and
- a framework for developing questions to facilitate learning.

The monograph is divided into seven broad sections. After the introduction, the second section provides a historical perspective on



questioning and its significance in the teaching-learning process and active learning. An attempt has also been made to provide guidelines for teachers on significance of questioning to piagetian developmental stages. The third section, presents an overview of what research knowledge on questioning says to the classroom teacher and draws out implications for teacher educators. The fourth section, has two parts. First part provides empirical data on teachers' classroom questioning practices with a view to learn the ground realities that exist in Indian Classrooms. The second part presents data on teacher educators' understanding of classroom questioning which highlights the need to develop material on questioning for use of teachers and teacher educators. To familiarize teachers and teacher educators with the vast variety of questions, the fifth section, A Glossary of Questions, gives details of the different terms and types of questions along with their definitions. The sixth section gives details on 'how and why' of questions. It provides guidelines and suggests techniques for teachers for structuring questions in the class and dealing with students' responses. The last section is related to exemplars on the different aspects of questioning i.e. the context, purpose, and basis of asking a question. Since lesson planning is seen as pathways to questioning an attempt has been made to present a lesson showing the questions which could be asked at different stages of the lesson and the function they serve.

This material is a small beginning to help teachers and teacher educators make effective use of questioning as a teaching device. It



also provides for examining how we question and how it can be improved to create a more productive classroom interaction.





## II

# QUESTIONING : ITS ROLE IN THE TEACHING-LEARNING PROCESS

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*"Intelligent people not only answer questions better, but also ask better questions. The time has come to measure and to teach not only how we answer questions, but also how we ask them".*

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*(Robert J. Sternberg, 1987)*

Questions and questioning is a way of life. Questions are tools of inquiry while questioning is a technique of inquiring. Questions are rooted in the science of ontogeny directed towards genesis of things, ideas, and happenings for better understanding of the field of study. A question seeks answers to the science or theory of knowledge i.e., epistemology. A question by a teacher, a student, or a parent indicates the need of knowing the unknown. In other words, a question is a mode of inquiry to solicit the intended response or find answers to what is not known. It is a verbal utterance that seeks response from the person to whom it is directed. It is one of the first things that arouses the curiosity and mental activity of a child and also stimulates and directs his thinking. Questions evoke and strengthen the learning behaviour that shape the students' method of inquiry and thought in a practically important sense (Chaudhari, 1975). Bruner maintained



that one of the most important rewards of learning is to be able to use the knowledge acquired in thinking. Bridging the gap between learning and thinking, however, requires expensive energy that usually has to be released by questions which may often go beyond what has been learnt (Torrance & Myers, 1970).

Questioning, as a tool or device of teaching, connotes direct or indirect appraisal of what a person knows or does not know. It attempts to challenge another person's faculty of mind and stimulates thinking by providing relevant stimuli. It is also viewed as an intellectual exercise calling for a response (Cornbleth, 1977). Good questions without efficient questioning serve little purpose while efficient questioning without quality questions may jeopardise intended learning outcomes which may lead to wrong inferences about student's learning. Sternberg (1987) commenting on questioning and intelligence states that, "question asking is as much a part of everyday intelligence as question answering, and that asking the right questions is important on the everyday as well as on the academic plane" (p.12).

Therefore, questioning and questions as a technique and tool go together and are closely integrated when used as teaching devices. Therefore, the efficiency of teaching can, to a large extent, be determined by the kind of questions asked, and the skill with which they are framed.

### ***Questioning : A Historical Perspective***

Education during the Vedic period was imparted directly to the pupil where the teacher played the main role. The method of teaching



was characterized by catechism which involved the education of a particular subject through a graduated series of questions and answers between the pupil and the teacher. The teacher put forth certain propositions to the pupil or the pupil himself asked questions which were answered by the teacher, thus removing doubts of the pupil. Such teaching-learning strategy helped to find out the solutions of the problems and answers to the curiosities in the minds of pupils, both of which constituted the chief method of education.

The educational system inherent in the Upanishads is argumentative. All the mysteries were unravelled through intelligent and leading questions. Some of the important methods of teaching that were employed were catechism, stories, allegories, parables, etc. During the course of discussion, the students were not passive listeners, but had to remain active and conscious. They had to cogitate answers to the question through the process of introspection and meditation. Accordingly, his mental faculty and imagination indirectly received exercise and training . The art of questioning therefore, appears to be the most ancient pedagogical method.

A similar kind of tradition in teaching was also present in the Greek culture. Great leaders of the Greek believed that an individual can never hope to find truth and morality through an institutional system of education. Aristotle was the first to distinguish the kinds of questions that together form the domain of inquiry, proposing that knowledge consists in answers to questions (Dillon, 1984). Socrates, a Greek educator, developed an original method of teaching known



as the dialectic or the conversational method, which enabled the learner to grasp the matter at hand. He maintained that the mission of a teacher is to lay bare those essentials as they would help the pupils to arrive at knowledge. Socrates put forth that a "question" is a midwife which brings forth the birth of ideas from the mind. He himself practised this "art of intellectual midwifery". The so-called 'Socratic method' of teacher questioning has since been widely advocated in theory during teacher training (Phipps, 1993). It was Socrates who made 'questioning' a front-rank teaching device by applying the subtle instrument of searching questions to stir up thinking. It is from the days of Socrates, questions have been thought essential to the pursuit of inquiry (Dillon, 1984). The dialogues of Socrates and dialectics of Plato have often been considered the epitome of intellectual discourse, and have been used as a model for all teachers and textbook authors (Chaudhari, 1975).

Theoretically, the importance of questioning activity in the process of thinking and learning has been stressed in literature since long. Developmental psychologists have emphasized the role of asking questions in the acquisition of intelligent behaviour and have discussed it in the context of special developmental periods such as question asking age and awakening of intelligence (Erikson, 1953).

Piaget's (1926) work on questioning, especially questions asked by young children, showed that the activity of questioning was a major form of oral speech among pre-school children. He studied 'why' questions and devised a functional classification of questions.





According to Piaget 'why' questions play an important role in the child's communication with adults. He found that most of the questions asked by the child were of an exploratory nature (causality), questions about the reasons for the behaviour of others, and about the logical reasons for rules, ideas, and customs.

Lewis (1936) aimed to show that the growth of questions in a child's life can best be understood in the context of development of his language. According to him questions arise and develop in the course of a child's endeavour to use language as a social instrument, and that the child's early questions do not express his desire to know about things, but rather his desire to have them. Lewis (1937) attempted to show that the development of questions take place in the following stages.

<b>Stage I</b>	The child demands that another person shall speak to him - that is the beginning of linguistic intercourse.
<b>Stage II</b>	The child begins to ask questions in a tentative way, as a preliminary to an intended act, within the situation in which he finds himself.
<b>Stage III</b>	The child's questions begin to refer to things absent from the present situation.
<b>Stage IV</b>	The child's questions begin to be independent of any situation or intended physical act.

Lewis (1951) showed that the growth of a child's questions is determined by social co-operation working upon two powerful tendencies in the child namely, to use language as play and as a means of satisfying his vital needs. During play, the question-and-answer gives the child practice in using questions and in replying to them before he is fully aware of their functions, and in fact fosters the



growth of these functions. Lewis emphasized that, for children, questioning appears to be a game that serves to initiate contact with others, or it can be an expression of wonder about unusual things and events.

Berlyne (1970) regarded question asking as a kind of epistemic behaviour, influenced by variables such as: novelty, incongruence and surprise. An explicit assumption is that students who can generate several types of questions are improving their own critical thinking skills (Vats, 1990).

### ***Piagetian Stages And Questioning***

Piaget's (1954) theoretical framework of children's cognitive development is suggestive of the kinds of skills children might be expected to develop at certain ages. Piaget's framework functions as a guide for the teacher to assist the developing child through the different stages of intellectual growth, by providing appropriate instruction in terms of learning sequences, and at the same time allowing the child to discover and structure his own learning. In view of that, not all children of a given age level have reached the same stage of cognitive development nor develop at the same rate across different areas (Mc Farland, 1971). The teacher needs to make provisions for learning experiences in view of different learning expectations from learners during the different stages of development. Therefore, in trying to teach the whole class, learning needs to be individualized. This has implications for the teaching techniques used by teachers (Woolfolk, 1998). Questioning, as a method of inquiry, offers opportunities to



gear 'instruction' to the child's own pace and stage of development.

Piaget's developmental stages can, in very broad terms, answer the question—what do children know and when do they know? In brief, during the sensorimotor stage, there is the development of knowledge through physical action. During the second, or pre-operational stage, the child's thoughts emerge but it is pre-logical and is best described as intuitive. In the next stage i.e. the concrete operational, the student's thought is logical but is confirmed to practical experiences. Finally in the formal operations stage, the adolescent demonstrates logical patterns of reasoning about abstract ideas and problems. The student demonstrates reflective thought. Piaget has shown that the thinking of children progresses in stages from motoric intelligence in the sensorimotor stage to deductions and the use of logic in the formal-operations stage (Muller, 1974).

In educational terms relevance of Piaget's theory lies in giving teachers a clearer idea and guidelines to promote learning appropriate to the child's level of thinking. Teachers may, therefore, focus on classroom questioning behaviour in relation to the developmental stages and opportunities and provide experiences in accordance with the child's readiness for learning. Some exemplars for teachers are given below:

#### A. Sensori Motor Stage (0-2years)

During this stage child's thinking involves seeing, hearing, moving, touching, tasting and so on. The child at this stage begins to make use of imitation and memory. The child begins to recognize that objects do



not cease to exist when they are hidden (i.e. object permanence) and moves from reflex actions to goal directed activity.

## B. Pre Operational Stage (2-7years)

During this stage a child gradually develops use of language and ability to think in symbolic form, is able to think operations logically in one direction and begins to acquire schemata of time, space and distance. The child at this stage has difficulty seeing another person's point of view. Keeping in view the kinds of thinking abilities of the child at each stage, the following guidelines will be beneficial to the teachers to foster learning at the child's level of development.

### i. *Use of concrete materials*

Since the child during this stage is not able to think in abstract terms, use of concrete props and visual aids like letter and number cut outs can help develop the ability to form new symbols. The teacher can use charts, diagrams, posters, pictures to explain the different terms of the lesson. The questions asked at this stage should usually be activity related. Questions of the kind given below may be asked using concrete examples.

- Giving 10 pieces of chalk to the child and then taking back 4, the teacher can ask - how many pieces of chalk are left? (subtraction)
- In class of 15 students, giving 30 pencils to a student, the teacher can ask him to divide it equally in the class. (division)
- Concepts of "half", "whole", or "part" can be taught by using cardboard/thermocool sheets.





ii. *Use of short precise clear instructions*

These should be accompanied with the use of actions as well as words. While beginning a class, the teacher can give instructions to students in the class like 'to clear their tables'. The teacher can demonstrate it herself or ask one of the students to demonstrate the procedure of keeping books, notebooks, pen or pencil on one side of the table. The following kind of questions can be asked:

- Has everyone cleared his tables?
- Take out your English books.
- Open your books on page 14.

iii. *To develop the use of language*

To build a foundation for concept learning and language development the teacher may provide a wide range of experiences, like outings and picnics which allow children to explore their surroundings, narration of stories, or involving children to play the characters of their favourite stories. Accordingly the teacher may ask questions like:

- Which letters make the word 'cat'?
- An incorrect sentence can be written on the board and the teacher can ask the students to correct it for example—*Milk drinks cat.*

C. **Concrete Operational Stage (7-11 years)**

In this stage the child is able to solve concrete (manipulable) problems in a logical manner, and recognizes the logical stability of



the physical world. The child understands laws of conservation on the basis of understanding the basic aspects of reasoning i.e. identity, compensation and reversibility. Other important operations mastered at this stage are classification and seriation. The teacher should present situations and ask questions that require logical and analytical thinking.

*i. Child is able to solve concrete problems in a logical manner*

Experiments like covering the candle flame with a jar will help explain the relationship between fire and oxygen. Questions like the following can be asked:

- What happens when you cover the candle flame with a jar?
- Why does the candle extinguish when you blow on it?

*ii. Understanding laws of conservation*

The child can be presented with problems that require logical, analytical reasoning. Teacher can make use of concrete materials like pencil, chalk etc.

- If I give you 3 pencils and take back one, and later I give you one more pencil, how many pencils will you have? (Identity)
- If you have 5 pencils and erasers and I take back 3 pencils and give you 3 pens. How many items would you have? (Compensation)
- Asking the child to raise his right hand and place the left one on the table. Then asking him to do the reverse. (Reversibility)



iii. *Providing opportunities to classify and group objects*

Children may be given concrete examples of different objects in increasingly complex levels to compare and classify.

- Asking students to bring vegetables and fruit from their homes. Accordingly the following instruction can be given to put them into groups according to their (a) Colour, or (b) shape.
- Giving students slips of paper with one sentence on one slip related to one particular profession e.g. Medicines are costly. Patients go to hospital. Machines help to diagnose disease. Doctors treat patients. Children may be asked the following question : Group these sentences into a paragraph and identify to which profession they belong?
- Draw your family portrait-heightwise for all members.
- Arrange the given weights of students in ascending and descending order.

40, 38, 29, 39, 45, 68, 70, 71.

To stimulate thinking, mind twisters, riddles, open-ended questions need to be focused on. e.g.

- Which is the largest four digit number ?
- How many words can be made from the letters in 'elephant'?

D. **Formal Operational Stage (11-Adult)**

Thinking during the level of formal operations is reversible, based on logical patterns of reasoning involving abstract elements. Children demonstrate hypothetico - deductive reasoning. They develop



concerns about social issues, identity and demonstrate adolescent ego-centrism.

i. At this stage the child is able to think in abstract terms. Students can be given an opportunity to explore many hypothetical questions for example :

- What would happen if there were no electricity ?
- Can you describe the snowfall in Delhi ?
- Can you describe the earth with no humans on it ?
- How many different types of combinations can you have from 3 squares, 2 triangles and 2 circles?

ii. Students can be given opportunities to solve problems and reason scientifically as exemplified in the given questions.

- Why does a log of wood float on water ?
- Why does ice float on water ?
- How does wearing woollens in winter help us to keep warm ?

iii. Teachers can have a discussion on sensitive issues like freedom/independence, apartheid/racial discrimination, religion, society etc. Certain broad concepts like sharing, honesty, superstitions etc. can be taught through use of questions like :

What will you do

- if your classmate forgot to bring lunch ? (sharing)
- if you got some money lying on the road ? (honesty)
- if you were going for an important task and a cat crossed your way ? (superstition)

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These guidelines are an attempt to show how judicious use of questioning can help teachers in the class to develop different kinds of thinking skills in children during the different stages of development.

### **Questioning : A Device for Teaching**

Asking questions represents a traditional and predominant teaching technique and has been a way of learning as well as teaching long before the different systems of formal education were established. Literature on questioning comes from diverse fields like sociology, psychology, education, philosophy, and linguistics, and comprises diverse mix of emphases. For some, it is a matter of practice while for others it is an object of study (Dillon, 1982b). Interactional nature of classroom discourse focuses on questioning as the most frequently used teaching device by teachers. The value of teacher's questions lies in the fact that it is the basic unit of most classroom teaching (Gall, 1973). Apart from pedagogical function, questioning performs an important psychological function of motivating students to think critically and reflectively and, in turn, to accelerate the learning-process. Aschner (1961) claimed that asking questions is one of the basic ways by which the teachers stimulate the students into thinking and learning. Use of questioning as a teaching technique by teachers helps to make teaching more participative and interactive as it provides for interchange of ideas and stimulation of thought.

In the context of large classes in India, use of questioning device in teaching learning strategies becomes all the more important for successful teaching. Questioning, if used effectively by the teacher,



could be an effective device which could help to develop the needed competencies in students and to get immediate feedback on students' learning. This in turn reinforces students' learning, provides experience of success, and develops positive self-concept, which, in turn, promotes learning and leads to better achievement. In addition, questions asked and used in an effective way facilitate development of desirable attitudes, develop and sustain interests, and provide new ways of dealing with the subject matter, and can add to the quality and purpose of evaluation. In fact, asking questions is considered very important in the entire field of knowledge acquisition (Voss & Heidi, 1983) which is almost entirely dependent on the teacher's skillful use of questions. Steinbrink (1985) considers learning to pose significant questions as an important life skill. In the development of intelligence Postman (1979, p.140) opined, that nothing can be more "basic" than learning how to ask productive questions. It is almost entirely dependent on the teacher's skillful use of questions. However, it has been observed that the traditional questioning approach focuses on students to solve unidimensional problems; providing one correct answer to every clear cut, closed question (Vats, 1990), which does not contribute to the increase of students' problem solving abilities (Zoller, 1987). It is, therefore, desirable to give questioning a significant place in the teaching-learning process so as to move closer to the ideals of education, which is to meet the needs of individual children.



## ***Questioning for Active Learning***

In recent years, development in education has placed much emphasis in helping children learn how to learn, to become independent in their learning, and to think for themselves. As Toffler (1970) states, "students must learn how to discard old ideas, how and when to replace them i.e., learn how to learn" (p.7). One of the most effective instruments of the teacher for stimulating and guiding this initiative is the question. In order to be independent in their learning, students too must learn how to question. Questioning generates the kind of talk and communication, which can lead to learning; questioning reveals to the teacher the readiness of students to take control; and questioning (by both students and teacher) establishes the interactional atmosphere of the classroom. And it is the nature of this discourse which dictates the quality of learning and helps students to be active participants in their learning (Thapan 1991; Woods, 1980). According to Vygotsky (1997) education should be structured in a manner that the child educates himself (p.48). According to him, the educational process is an active one on three levels : the student is active, the teacher is active, and the environment created between them is an active one (p.54). Questions' therefore, become the means to gather information from the environment. If the learner is essentially active and questioning, education is to do with questions, not just asking them, but rather creating questionable situations, so that the child is able to make a decision (Vats, 1990). It may be said that since 'education is a process of inquiry', questions



serve as chief agents by which meanings are mediated in classroom interactions which help this process.

Classroom communication research has identified question-and-answer cycle as one of the structural component of teacher-pupil interaction. A number of studies show that in classroom talk this component appears to constitute 60% of total 'teacher talk'. Steven (1912) stated that 4/5th of school time was occupied with question and answers. More recently Gallon, Simon and Croll (1980) reported that one-fifth of the teacher's spoken phrases and sentences in the classroom were in the form of questions. Therefore, to understand the classroom interaction, it is important to understand the concepts of questioning and questions and their roles in the enhancement of classroom environment. Classroom interaction sets students into the process of inquiry (thinking, feeling, discussing, arguing, philosophizing, etc.) and most often the teacher is the initiator of this action. Vygotskian model has highlighted that the function of teaching is to accelerate development, and the teacher is an intervener who focuses on the critical role of mediating between the pupil and learning paradigm. Thus the emphasis of the constructivistic learning is on the context of social interaction which takes place in the classroom. These interactions among pupil-teacher-task can be generated by various materials and techniques, of which questioning is one. Judicious questioning serves to orient the child towards inconsistencies in his own thinking or phenomena, if any, that might otherwise be over-looked or even taken for granted. This kind of





questioning views child as an active learner and demands teachers' skill to employ different techniques. Skills in teaching and success in learning as suggested, may in part be determined by questions used in the classroom. Especially in view of the supportive evidences, the direction as well as the level of learning are considered being influenced by the questions asked in the classroom.

Research too has demonstrated that the teacher's questions and ways of using them are crucial in helping students learn how to think as the type of questions asked indicate the cognitive demands the teacher makes on the students. Thought can be stimulated by carefully selected questions drawn on the learning possibilities inherent in the subject matter (Rogers, 1972), and, at the same time, questions too have some sort of vitality that challenges students to approach their learning creatively. The greatest effect of the question is the way and extent to which it causes the pupil to think. This primarily depends upon the teacher's skill in being able to ask questions which generate different kinds of learning. Wragg (1992) however reported that most of the teacher questions were concerned with management and control of the class. Therefore, a teacher to nurture the interactive process in the class needs to develop in himself the expertise in questioning skill. Besides this, motivating and helping students to develop skills in asking productive questions will lead to their active participation in the class room.



This has implications for questioning in classroom since effective questions :

- generate interest and thinking in the students ;
- create a dialogue of exchange for thoughts and feelings to build understanding;
- develop the skill of listening and to know how to respond ;
- make teachers aware of appropriate wait time for students to answer ;
- highlight that teacher's role as that of a facilitator of learning; not the final authority of knowledge; and
- make the teacher a reflective learner in this process; seeking answers as well as questions.

It is in this context that teachers need to develop requisite knowledge and skills in asking questions. In fact empowering teachers with the questioning skills would go a long way in improving teaching-learning in classrooms.



### III

## RESEARCH ON TEACHER QUESTIONING

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*Every time you ask a question you are presenting that question as a model to your students and modelling effective questions will help your students to ask better questions themselves.*

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*(Hunkins, 1974)*

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It is hard to think of a classroom without the teacher and students asking questions. This is because teaching involves asking questions, in such a manner as would enable teachers to provide instruction, receive feedback and evaluate students' learning. Questions are recognized as the indispensable tool of educators. During the teaching-learning process in the classroom, teachers need to raise and respond to their student's level of understanding, and at the same time keep the students actively engaged in learning. Importance of questioning in the teaching-learning process gains significance in view of the fact that research has demonstrated that questions posed by the teacher in the classroom help to stimulate students' thinking and thus set the tone of learning.

Researches on teacher questioning have emphasized



characteristics such as the number of questions asked by the teacher over a period of time, levels of teacher's questions and their correspondence to students' answer, impact of teacher questions on students' thinking and outcomes (in relation to achievement), teacher questioning techniques and strategies for training of teachers. The studies have attempted to find answers to the questions such as the following.

- What are the actual questioning practices of teachers in classroom?
- Do the kinds of questions teachers ask really affect how well students learn?
- Can teachers promote critical and analytical thinking by asking higher level questions?
- How can teachers improve their questioning skills?

This section attempts to find answers to the above questions on the basis of the available research evidences. The purpose is to provide teachers and teacher educators a set of guidelines for instructional use of questions. Effort has been made to integrate what is known and what is not known about the effects of asking different types of questions in the classroom. The findings of these studies have implications for Indian classrooms. Also, only selected studies have been cited in this section.





## ***Historical View***

Since the time of Socrates, questioning has been recognized as one of the most influential techniques to stimulate thinking and learning. Questions asked in the classroom have been the subject of concern both for instructional method as well as for empirical investigation. The first major systematic research study on questioning was conducted by Stevens at Columbia University in 1912. Until 1950 research on questioning primarily focused on describing teacher's questioning behaviour and supported Steven's finding that classroom questions emphasize stimulating memory level thinking. During the 1950's, research efforts of Bloom and Guilford led to the development of systematic approaches to identify the cognitive levels of questions in the classroom. A number of training programmes in questioning were developed, tested and applied during the 1960's to identify specific questioning levels and skills that have an impact on pupil growth. It has been observed that the application of such alternative practices in the classroom to enhance teaching effectiveness has been one of the significant outcomes of research related to questioning (Rosenshine, 1979).

## ***What Functions Do Questions Perform?***

The value of questions is highlighted in the functions assigned to it by the classroom teacher and illustrates its centrality in the teaching learning process. Research (e.g.) Gall, 1970; Good & Brophy,



1978) says that questions are seen by teachers as useful tools in the classroom transaction as they help to :

- arouse interest and sustain attention of students on the learning task,
- transact the content of the lesson,
- seek information, maintain order and discipline in the class,
- provide feedback on student's learning and progress,
- diagnose student's difficulties in learning,
- judge effectiveness of teaching,
- provide a vehicle for teachers and students to jointly create knowledge, and
- evaluate student's learning.

Thus the importance of questions in class relates to teaching, testing and managing students' responses. This raises the question - Is the potential of the question fully exploited? Although questions have the capability of initiating critical and creative thinking, research indicates a discrepancy between the stated purpose and actual practice of questioning in the class.

### **What Are The Questioning Practices Of Teachers?**

Literature has shown that asking questions is the basic unit underlying most methods of classroom teaching and is also one of the basic ways to stimulate students' thinking and learning. Research, however, indicates that the predominant emphasis of teachers' questions have been on acquiring knowledge of facts.



The studies have consistently shown that teachers in class ask :

- low percentage of questions as compared to total time devoted to teachers' verbal behaviour.
- students solve undimensional problems, and are expected to provide one correct answer to every clear cut, closed question (e.g. Kaul, 1975; Vats, 1990).
- most of the questions (87%) are at the memory level, majority being recall type (e.g. Moriber, 1972; Chaudhari, 1975).
- more questions requiring direct recall of information than open ended or clarifying questions (e.g. Goldbold, 1970; Hamilton & Brady, 1991).
- questions related to memory or acquisition of knowledge (e.g. Davis & Tinsley, 1967; Davis, Morse, Rogers & Tinsley, 1969).

Research findings on kinds of questions asked by teachers can be summarized as:

- high percentage of questions are in the category of stimulating lower level of cognitive functioning, and
- low incidence of questions beyond recall of information.

A possible explanation is that teachers are not aware of the cognitive level of inquiry which questions can elicit in students. This implies that teachers need to examine the relationship between questioning and the level of thinking it evokes in students as well as its impact on students' outcomes.



***The major cognitive objective of teachers' verbal questions relates to memory acquisition or factual knowledge.***

### ***Questioning and Thinking***

It is generally believed that teachers' use of questions promote thinking among pupils. Researches have reported congruence between the cognitive level of teacher questions and thinking as indicated in student responses. However, review of researches reveals that relatively few teachers systematically employ questions that require students to utilize higher cognitive process. (e.g., Aschner, 1961, 1963; Berlyne, 1970; Ladd & Anderson, 1970; Gallagher & Gallagher, 1975). The findings of research studies regarding the relationship between the cognitive levels of teacher questions and thinking as indicated in pupil responses show that :

- Cognitive level and length of pupil responses were highly contingent on cognitive level of teacher questions (Cole & Williams, 1973; Chaudhari, 1975; Simmons, 1976; Mills, Rice, Berliner & Rousseau, 1980; Dillon, 1982; Dantonio & Paradise, 1988).
- 50% increase in the percentage of divergent level question stimulated a 40% increase in divergent responses from students (Aschner, 1963, Gallagher and Gallagher 1965).
- Relationship of divergent level questions to divergent responses from students indicate that teacher controls the thought level of





students in the classroom. (Wilén, 1982).

It may be concluded that teachers need to know the importance of :

- balancing low and high (cognitive) level questions to stimulate thinking at all levels, and
- asking lower frequency of higher level questions since higher level questions demand more time for reflection.

Findings of the studies not reporting any relationship between levels of question and pupil responses suggest ineffectiveness of questioning to stimulate thinking required by a higher level cognitive question. This has implications for developing questioning skills in the teacher.

***Employing questioning as a teaching strategy has a significant influence in guiding and developing the thought processes of students.***

### ***Questioning And 'Wait-Time'***

An important component of students thinking, especially at the higher cognitive levels, is the time allotted by the teacher for the pupil to respond after a question is asked which is termed as 'wait-time' or 'thinking time' (Morgan and Saxton, 1997). Effect of wait-time has been studied in relation to its use, increase in wait-time, and level of student response to teacher questions.



The studies have shown that :

- Average wait time for majority of the teachers is one second (Rowe, 1974).
- Teachers can be trained to increase their wait time (e.g., Rowe, 1974; Tobin 1987, Gliessman, Fagan, Hassler & Szabo 1981; Jangira, 1981; Swift and Gooding, 1983; Dowden and Hunkins, 1988).

Also studies have reported that increase in wait-time to 3 to 5 seconds results in :

- increase in cognitive level of teachers' questions,
- increase in the length of students responses to teachers' question,
- increase in the number of contributions of slow students,
- more number of high level and probing questions by teachers,
- fewer verbal patterns repeated by the teacher,
- fewer low cognitive level questions, and
- decrease in the amount of teacher talk.

***Wait-time, thus, appears to be one of the critical variables in determining the cognitive level and affective climate of classroom.***

This has implications for training of teachers to change their verbal strategies for responding and reacting.

### **Questioning Skill & Strategies**

Researchers have investigated ways and means to develop the



teacher's ability to ask higher level, inquiry-provoking questions. Skilful questioning is viewed as one of the most valuable techniques available to teachers. The correspondence between teacher's question and pupil responses has been examined in relation to different teaching skills. Studies have demonstrated the effect of different kinds of questioning skills and strategies which can be used by teachers. These studies attempt to answer whether training in use of cognitively cued questions, redirecting, refocussing, using prompts etc. result in increase in cognitive correspondence between teacher questions and student responses?

The findings show that training on questioning strategy relating to the use of skills such as:

- verbal prompts help students to develop awareness of the levels of thought needed to respond to questions (e.g. Rogers, 1972; Maheshwari, 1976; Mills, Berliner & Rosseau, 1980; Menke & Pressley, 1994).
- seeking clarification, and redirection result in increase in the percentage of higher order questions asked and the answers received from students (e.g., Paintal, 1982; Dillon, 1984).
- questioning-answering-feedback produced higher level of application ability among students (e.d., Padma, 1976; Shaida, 1976; Chakraborty, 1978; Peeck, 1979).

The research findings show that correspondence of cognitive level



of question to level of student response was high when any of the following skills were used :

- Prompts
- Probing
- Redirection
- Refocussing
- Feedback
- Cognitive cueing

This has implications for modifying the verbal behaviour of teachers and training of teachers in the use of questioning skills in the classroom.

***An effective questioning strategy not only aims at knowing what has been learned, it also enhances or changes the student's way of answering.***

### ***Questioning And Student Achievement***

Researches have demonstrated that teacher questions have a major impact on the quality and quantity of student outcomes particularly, academic achievement. Researches employing classroom questions as independent variables and student outcomes as dependent variables attempt to provide answer to different level of question like classification, interpretation, generalization, analysis, elaboration etc. on student achievement. The level of question refers





to the nature of cognitive processing required to answer a question (Andre, 1979). In this perspective, the question is seen as a potential instructional tool that can be used by the teachers to produce certain kinds of learning.

*What do these studies tell us?*

The findings of the various studies on effect of level of question to student achievement have reported:

- positive relationship between higher order questions (analysis, evaluation and generalization) and pupil achievement (Spaulding, 1964; Soar, 1966; Klienman, 1969; Ryan, 1974; Kersi, 1974; Adams, 1975; Merlino, 1976 & Tiedman, 1977; Kumar, 1982).
- teachers engaged in greater proportion of inquiry questions caused greater change in pupil achievement (Ladd, 1969; Ladd & Anderson, 1970; Bugghey, 1970; Ryan, 1973; Winne, 1979).
- high cognitive level questions (analysis and evaluation) produced significantly greater scores in social studies achievement than did low cognitive level (knowledge) questions (Schreiber, 1967; Hunkins, 1968; Savage, 1972; Ryan, 1974; Kniep, Grossman, 1982; Steinbrink, 1985).
- better response to inferential questions by average readers as compared to below average readers (Wilson, 1978).
- narrow questions produced higher pupil achievement at knowledge and comprehension level and not at application level (e.g, Sharma, 1972; Lilimon, 1973; Shaida, 1976).



The findings suggest that :-

- there exists a positive relationship between classroom questions at different levels, and pupils' achievement,
- higher level questions are related to higher achievement across different grades and subject areas.

***Research on teacher questioning behaviours advocates the use of higher-order teacher questions to encourage and enhance student's thinking and achievement.***

### ***How to Question Effectively?***

Research also suggests that effective questioning is contingent upon technique and methodology of asking questions in the classroom.

*Can differences in the way questions are posed affect responses from different kinds of students?*

Literature (e.g., Buch & Santhanam, 1970; Cole & Williams, 1973; Gall, Ward, Berliner, Cohen, Winne, 1978; Elsgaest, 1985; Kishore, 1988) has shown that the various aspects of effective questioning are: speed, voice, tone, intonation, distribution, pause etc.

- the speed with which a question is asked in the classroom determines its comprehensibility,
- questions aimed at stimulating thinking need to be asked at slower speed,
- stating the question in a voice audible to all students sitting in the classroom,
- tone, intonation of the question determine the intent of the



question,

- proper distribution of questions in the class i.e. to students sitting in the front and back seats, volunteers and non-volunteers, and
- providing appropriate pause after stating the question.

***No single approach to questioning works best in every classroom. Factors like lesson objectives, context and student response determine the effectiveness of the questions.***

Therefore, teachers need to adapt questioning technique according to the demands of the situation.

### ***Effect of Training Teachers on Questioning***

To facilitate thinking abilities in children teacher educators need to develop necessary skills in teachers for evaluating and raising the cognitive levels of thought. In actual practice, however as indicated by research, teachers do not seem to possess the requisite skills to ask questions of the kind or are unable to utilize it adequately. However, researches have demonstrated the use of different strategies for training teachers to develop the necessary questioning skills.

Studies on pre-service, in-service, trainee teachers exposed to either of the different training strategies have reported that :

- programmes based on modelling, self-feedback and micro teaching showed an increase in redirection questions, thought questions and probing questioning (Borg, Kelley, Hanger & Gall,



1970;. Saunders, Nielson, Gall & Smith, 1975; Esquivel, 1978).

- there is a decrease in knowledge level questions and increase in synthesis and evaluation questions (Caroline, et. al. 1971; Gallusi, Gall, Dunning and Banks, 1974; Roy, 1977; Chakraborty, 1978).
- use of self-instructional methods showed superiority in developing concepts and skills essential to instruction for higher cognitive process (Merwin & Schneider, 1973).
- use of self-instructional multi-media package resulted in improvement in the use of questioning skill (Shah, 1980; Jangira, Dhoundiyal, 1981; Paintal, 1982).
- use of audio-video tapes, micro-teaching and role play result in higher number of translation and interpretation questions asked by teachers (e.g., Rogers, 1969; Galassi, Gall, Dunnig & Banks, 1974; Gall & Smith, 1975; Kumar & Lall, 1980; Khan, 1985; Kalyanpurkar, 1986; Sharma, 1986).
- use of self-instructional training materials resulted in increase in proportion of open questions (Winne, 1980).

Also a number of studies have demonstrated that learning to classify questions is an effective strategy to improve teachers understanding of questioning and to increase cognitive emphasis of their questions.





The findings of the studies report that use of classification schemes:

- proved effective in increasing the diversities of questions asked by student teachers and also resulted in lowering of procedural questions (Roger & Davis, 1971; Riley II, 1980).
- result in change in attitude of teachers to the use of questioning in the classroom (Riley II 1980, Mills, Rice, Berliner & Rosseau 1980; Bawa 1985).

Studies indicate that familiarity with various categories of questions enable teachers to frame questions at different levels during teaching learning situations. It is also evident that the notion of how to develop an effective strategy is inclusive of how to develop a variety of questions.

The major training strategies/materials having impact on questioning behaviour of teachers are :

- classification systems/categories
- self-instructional material
- peer feedback
- multi-media package
- micro-teaching (peer and school based)
- role play of alternate questioning strategies.

If questions foster specific kind of thinking and teachers can be trained to recognize and develop appropriate use of questioning techniques, adequate attention needs to be given on developing the skill of questioning in teacher preparation.



### ***What research says to the classroom teacher ?***

The findings of the research studies suggest that teachers in the classroom need to:

- know the various functions performed by questions,
- increase the number of questions asked to make teaching effective,
- ask higher order questions to stimulate thinking and achievement,
- increase the pause (wait-time) after stating a question to improve student's response,
- make use of skills of probing, prompting, redirecting, refocussing etc. to facilitate students' response at desired levels,
- develop skills in questioning and structuring questions,
- learn to classify questions to increase the cognitive emphasis of their question.

### ***Implications of Research on Questioning for Teacher Educators***

What does research say to teacher educators about the techniques of questioning available to teachers to guide students learning ? Reflecting on the researches on questioning, tentative conclusions can be drawn and implications derived for use of teacher educators:

1. Asking questions requiring primarily recall information have been the focus of teacher classroom behaviour. If ability to



think is an important goal of classroom instruction, teacher educators need to stress to teachers the importance of devising strategies that provide for pre planned higher convergent and divergent questions along with low level memory questions.

2. Teachers should be acquainted with the means of classifying questions, either by levels or functions, to ensure higher cognitive level questions and thought levels evoked through oral or written questioning.
3. Teachers should be trained to raise the cognitive emphasis of their questions. Teacher educators can develop training programmes to prepare teachers to ask questions at different levels. An awareness of different categories/classifications systems of questions may also help them to frame their questions.
4. In view of the correspondence between cognitive level of questions asked by teachers and student responses, teacher educators need to prepare teachers with the relationship of different levels of questions to thinking, and demonstrate use of verbal cueing techniques to assist students to respond at appropriate thought level.
5. The quality and quantity of students' responses is influenced by the extent of wait-time after teachers ask a question. Teacher preparation needs to provide training opportunities for teachers to practice increasing their wait-time to a minimum of 3 seconds.



6. Instruction in how to develop a variety of questions is inclusive of how to develop an effective questioning strategy. Effective questioning practices should be developed through use of audio video films, instructional material, peer feed back, micro-teaching and actual classroom experience.

In sum, research shows the influence of teacher's questions on both the quantity and quality of student's response and the level of thought generated in the students. Research has also demonstrated the effectiveness of different levels of questions to student outcomes, in particular academic achievement. Thus teacher questions can be a significant influence in guiding and developing the thought processes of students. This has implications for teacher training programmes to provide training in specific skills of classroom questioning highlighting purpose of questions and their cognitive emphases.

In view of the research knowledge on questioning it seems pertinent to know the classroom realities in Indian context. The following section provides empirical evidence on teachers' actual classroom questioning behaviour and teacher educators' understanding on questioning.





## IV

### QUESTIONING : CLASSROOM REALITIES

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*"Asking questions is one of the basic ways by which the teacher stimulates student thinking and learning."*

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*(Aschner, 1961)*

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This section presents a view of questioning as a tool, used by teachers in actual classroom practice and teacher educator's understanding of questioning as a technique. Data on teacher questions in classroom was collected from a small sample of classrooms (N=33) of Kendriya Vidyalaya and Delhi Administration schools. It provides empirical evidence of the kinds and levels of questions asked in actual classroom situation. In addition to this, data from teacher educators (N=77) at the elementary level was gathered through a questionnaire to know their



understanding of questioning. Though only a small sample of classrooms were observed, this exploration provides a view of ground realities in the Indian classroom and in teacher preparation. This section is divided into two parts : -

- 1 Teacher Questioning in classroom : An exploration.
- 2 Understanding and use of Questioning : Views of Teacher Educators

### ***1. Teacher Questioning in Classroom-An Exploration***

Data was generated on teacher questioning in an attempt to know the status of questioning in schools of Delhi. The study involved observations of teachers' questioning behaviour in class VI in 33 classrooms\* of Kendriya Vidyalaya and Delhi Administration schools. The type and number of questions asked by teachers at different stages of the lesson were examined. In all, 10 classrooms formed the sample for observing lessons in science, 9 in social

*\* In 11 classrooms it was observed that the teacher did not question students on any aspect. The students were asked to read the lesson in turns, or were asked to work on their own. This may perhaps be the result of the presence of the observer in the class.*



studies, 8 in Hindi, and 6 in English. All questions across different subject areas were examined independently by three persons to seek congruence for classifying them under the various dimensions.

The analysis yields information on the average number of teacher questions asked in each subject at different stages of instruction, related either to content of teaching or managerial in nature. The stages of instruction were divided into pre-instructional, instructional and post-instructional phases. The managerial questions were further divided into motivational, directional and attention seeking types. Content related questions were categorised into three levels, (i) knowledge (content information), (ii) understanding (comprehension) and (iii) an application indicating the learning outcomes focused on. The analysis undertaken is presented in the following section and provides an insight into the nature and quality of questions used by teachers during teaching in the given sample of Indian



classrooms. The data is presented in a tabular form separately for each subject along with the findings.





# SUBJECT-WISE ANALYSIS OF CLASSROOM QUESTIONS

## 1. SOCIAL STUDIES

The total number of classes observed in social studies were nine. Table 1 shows the number of questions asked in each class during the various stages of instruction. These questions were further classified into managerial and content related questions.

**Table : 1 Analysis of teacher classroom questions in Social-Studies.**

No. of Classes Observed	No. of Ques.	Stages of Instruction			Management Questions			Content Related Questions		
		*Pre-I	I	Pos-I	*Mot.	Direc.	Atten.	*K	U	A
A	35	0	34	1	0	8	0	20	7	0
B	46	8	32	6	4	12	4	20	6	0
C	12	7	5	0	0	3	1	5	3	0
D	19	2	0	17	1	0	1	14	3	0
E	19	4	14	1	0	7	5	2	5	0
F	14	2	12	0	0	4	1	0	8	1
G	32	6	21	5	3	2	4	19	6	0
H	14	3	9	2	1	1	2	8	2	0
I	26	3	18	5	4	3	1	12	6	0
Total	217	35	145	37	13	40	19	100	46	1
Av	24.1				33.17%			67.74%		
%		16.12	66.8	17.0	18.1	55.6	26.4	67.6	31.7	0.7

\* Pre - I Pre-Instructional  
I Instructional  
Post -I Post-Instructional  
Mot. Motivational  
Direc Directional

Atten : Attentional  
K Knowledge  
U , Understanding  
A : Application

1

1

The data reveals that the average number of questions asked in social studies classrooms were 24.1. The number of questions asked during the instructional stage, were 67 percent, whereas questions asked during the pre-instructional and post-instructional stages did not differ much i.e. 16 percent and 17 percent respectively. Thirty three percent question were of management type whereas 67 percent were content related questions. Among the management questions, 56 percent were related to providing directions to students, 18 percent were directed at motivating the students or arousing interest of the students, whereas 26 percent aimed at sustaining attention of students on the task. The content related questions focussed largely on the knowledge aspect (68%) followed by understanding aspect (32%) whereas application related questions were negligible (0.7%).

## **2. SCIENCE**

In all ten classes in science subject were observed. The average number of questions were 25.7 as shown in Table 2. Questions asked during the instructional stage were 62 percent , while questions asked at pre-instructional and post-instructional stages were 9 percent and 29 percent respectively. Data shows that 66 percent of questions asked were content related and 34 percent



were management type questions. Among the management questions 70 percent were related to providing directions, to students, 24 percent aimed at sustaining attention, and only six percent of the questions were related to motivating students in class. Maximum questions in the content related category were of knowledge type i.e. 65 percent. Understanding and application based questions asked in these classes were 22 percent and 13 percent respectively.

**Table : 2 Analysis of teacher classroom questions in Science.**

Classes Observed	No. of Ques.	Stages of Instruction			Management Questions			Content Related Questions		
		*Pre-I	I	Post-I	*Mot.	Direc.	Atten.	*K	U	A
A	16	2	6	8	0	6	2	6	2	0
B	23	2	13	8	0	8	1	8	2	4
C	39	2	34	3	0	6	0	22	9	2
D	39	3	36	0	0	10	3	21	2	3
E	22	2	8	12	0	9	3	4	2	4
F	34	3	16	15	1	4	2	16	8	3
G	18	2	11	5	0	3	1	8	3	3
H	26	1	14	11	0	5	3	12	4	2
I	24	4	13	7	2	8	3	9	2	0
J	16	2	8	6	2	2	3	4	4	1
Total	257	23	159	75	5	61	21	110	38	22
Average number	25.7					33.8%		66.14%		
%		8.9	61.8	29.1	5.8	70.1	24.1	64.7	22.4	12.9
* Pre - I	Pre-Instructional							Atten : Attentional		
I	Instructional							K : Knowledge		
Post - I	Post-Instructional							U : Understanding		
Mot	Motivational							A : Application		
Direc	Directional									



### 3. HINDI

A total of eight classes were observed in Hindi to study the type of questions asked by the teacher. As shown in Table : 3 the average number of questions asked were 21.3.

**Table : 3 Analysis of teacher classroom questions in Hindi.**

Classes Observed	No. of Ques.	Stages of Instruction			Management Questions			Content Related Questions		
		*Pre-I	I	Pos-I	*Mot.	Direc.	Atten.	* K	U	A
A	28	2	26	0	0	6	1	14	6	1
B	14	1	9	2	0	3	1	5	3	0
C	34	6	17	11	0	0	10	24	0	0
D	21	7	14	0	0	8	1	3	5	0
E	18	4	11	3	1	7	1	8	0	0
F	19	3	9	7	2	4	1	6	3	0
G	11	2	5	4	3	4	2	2	0	0
H	26	4	18	4	3	6	1	10	4	0
Total	171	31	109	31	9	38	30	72	21	1
Average number	21.3					45.02%		54.9%		
%		18.1	63.7	18.1	11.7	49.3	30	76.6	22.3	1.1

\* Pre - I Pre-Instructional  
I Instructional  
Post -I Post-Instructional  
Mot Motivational  
Direc Directional

Atten Attentional  
K Knowledge  
U Understanding  
A Application

An evident majority of the questions asked were during the instructional stage (64%). Questions asked both at pre-instructional and post-instructional stages were same percent. i.e. 18 percent. Forty five percent of the questions in these classes were of management type and 55 percent were content related questions. Data reveals that only 12 percent of the questions





asked by the teachers related to motivating students, 39 percent aimed at sustaining attention of the pupil and 49 percent related to the providing directions to students. Among the content related questions, majority of the questions i.e. 77 percent were knowledge based followed by understanding questions (22%) whereas negligible questions (1%) were of application type.

#### 4. **ENGLISH**

A total number of six classes were observed for questions in English. The average number of questions were 11 as shown in Table 4.

**Table : 4 Analysis of teacher classroom questions in English.**

Classes Observed	No. of Ques.	Stages of Instruction			Management Questions			Content Related Questions		
		*Pre -I	I	Post-I	*Mot.	Direc.	Atten.	* K	U	A
A	7	2	5	0	0	4	3	0	0	0
B	11	5	5	1	4	2	2	1	2	0
C	18	9	4	5	6	4	3	4	1	0
D	10	3	6	1	3	2	4	1	0	0
E	12	3	7	2	4	2	2	4	0	0
F	8	4	2	2	1	3	2	4	0	0
Total	66	26	29	11	18	17	16	12	3	0
Average number	11					77.2%		22.7%		
%		39.3	43.9	16.6	35.3	33.3	31.4	80	20	0

\* Pre - I : Pre-Instructional  
 I : Instructional  
 Post - I : Post-Instructional  
 Mpt. : Motivational  
 Direc : Directional  
 Atten : Attentional  
 K : Knowledge  
 U : Understanding  
 A : Application



Data reveals that 44 percent of the questions were asked during the instructional stage, while 39 percent questions were asked at the pre-instructional stage, and 17% at post-instructional stage. Seventy seven percent questions related to management of the class and 23 percent were content related questions. Among the management questions, motivational were 35 percent, questions to provide directions to students were 33 percent while questions to secure or sustain attention of the student's on the task were 31 percent. In the category of content related questions, eighty percent questions were related to knowledge aspect, and twenty percent were understanding based however, no application questions were observed in the classes.

### *Trends Shown In Classroom Questioning*

1. Questions requiring direct recall of information i.e. Knowledge based were the most common type (more than 70%) found in oral-teacher questioning during classroom observations of Social-studies, Science, Hindi and English. The application questions however asked were negligible (less than 1%).
2. Questions for classroom management relate maximum to providing directions to students followed by questions for



sustaining attention of the students. Questions for motivation of students were comparably low.

3. Questions asked during instructional stage were more (appox. 3 times) as compared to pre-post instructional stages.
4. The average number of questions asked by the teacher during a single class (i.e. appox. 30-35 min) were about 20.

Questioning behaviour of teachers show nearly a similar pattern across the different subject areas. Maximum questions were knowledge based, pertain to giving directions and were asked during the instructional stage. Though the frequency of questions differ in different subject areas.

### ***Implications***

The results give an indication of the changes needed in the questioning practices of teachers. This has implications for teacher training programmes to create awareness and concern for the number of questions asked and cognitive level of questions as related to the instructional objectives. Since the general emphasis of the teachers is on low-level, cognitive memory i.e. knowledge based questions, a possible explanation for this situation may be that teachers are not sure of the functions performed by the



question. In this context it is felt that, there is a need to familiarize teachers with the framework of questioning to help them review the questions used by them in their teaching. Experiences in classifying the questions of fellow-trainees during teacher preparation may also help develop insight into the different stages, levels and types of questions.





## **2. *Understanding and Use of Questioning: Views of Teacher Educators***

Questioning has been a way of learning and teaching long before the formal systems of education were established. It represents a predominant teaching technique and continues to be the most common technique used by teachers to gather information on students' grasp of new material and also retention of previous learning. The role of questioning in getting students to think critically, analytically, rigorously and effectively is well established. Besides being an indicator of teaching-learning approaches, questioning also provides an answer to the issue of matching the task to the student's level. In the context of large classes in India, use of questioning device in teaching-learning strategies becomes all the more important for successful teaching (Sibia, 1997). Against this backdrop, it is felt that perception of teacher educators particularly at the elementary level would help to throw light on their understanding of classroom questioning and help identify gaps in teacher preparation.

Data on various questioning aspects was generated through a questionnaire administered to teacher educators, to know about their understanding of the different aspects related to questioning.



The main aim was to explore the extent to which they were familiar with questions regarding questioning and questions as tool or technique, uses of questioning as a teaching device, levels of questions, types of questions, structuring of questions and form of questions, use of questions for remediation, whether questions need to be addressed to the whole class or to an individual and how they are related to the development of intellectual skills. (Questionnaire Appended)

Teacher educators of District Institute of Education and Training (DIET) from eleven different states in India constituted the sample for administration of the questionnaire. A total of 77 teacher educators who participated in the training programmes organized by the Department of Educational Psychology and Foundations of Education (DEPFE) provided data related to the different aspects of questioning.

### ***Data Analysis***

Teacher educators (N=77) filled up a questionnaire consisting of questions relating to their understanding of the various aspects of questioning. The responses were analyzed and categorized. The frequency of the responses and percentage were calculated for each response category. A detailed analysis and interpretation of the different aspects of questioning are given below.



## *1. Questioning a tool or a technique*

When asked whether questioning is a technique or tool of teaching, 68 % teacher educators responded that it is a technique. Five (7%) were of the opinion that questioning is a tool and four (5%) did not respond to the question.

On inquiring whether questions were tools or technique of teaching, 65 (85%) of the teacher educators responded to it as tool. Eleven (14%) however related questions to technique of teaching and not as a tool. One teacher educator did not provide any response.

## *2. Functions of questioning in teaching*

The teacher educators were asked to respond to the question: "What are the important purposes for which questioning can be used while teaching a class?" Table 5 contains the responses. It emerged that questioning helps in initiating the lesson, proceed or develop the lesson, focus attention of the students, making the subject matter understandable, diagnosis of learning difficulties, testing knowledge, receive feedback, etc. The three most frequently stated functions of questioning were : testing of previous knowledge, evaluation of a topic and increasing teacher-pupil interaction. As evident, teacher educators view



testing or evaluation as a significant and pre-dominant activity in the class.

**Table : 5 Purposes of Teachers' Questions as indicated by responses of elementary teachers educators (N=77)**

	Purpose	f	%
1	Introducing, starting the topic, or lesson	5	6.5
2.	Develop, proceed or advance with the lesson	6	7.8
3.	Focus attract or divert attention of students, make pupils concentrate on topic	9	11.7
4.	Increase teacher-pupil interaction for rapport, counselling, exchanging experiences, create an environment for active participation	16	20.8
5.	Make subject clear, understandable and explaining the matter, provide opportunities for asking questions	14	18.2
6.	Motivate the class, increase interest of children in the topic	7	9.1
7.	Diagnosis of students with difficulties	1	1.3
8.	Know the previous knowledge of the child, realise level of achievement	19	24.7
9	To develop thinking ability, use knowledge in various situations	2	2.6
10.	For the all around development of the child	4	5.2
11.	To test teacher's skill, obtain feedback on teacher's success, reflecting on teacher transaction	6	7.8
12.	To evaluate the topic, evaluate what the teacher has taught, output, & testing previous knowledge, content, understanding of subject, test students knowledge of how much they have grasped.	40	52.0





Further categorization of the responses was carried out with regard to the use of questioning to the managerial functions and pedagogical (teaching-learning transaction) functions. Among the managerial functions, 21 percent of the responses related to increasing student-teacher interaction which was followed by focusing attention of the students (12%) and motivating the class (10%) In consonance with the traditionally held view of questioning, 52 percent of the responses indicated that an important purpose of questioning is evaluation of the subject matter which helps to find out what the pupils have learned.

Some teacher educators (n=6 ) opined that questioning helps to "obtain feedback on teacher's effectiveness", and thus helps in making improvements in teaching strategies. This also indicates a diagnostic use of questioning which otherwise has been explicitly stated only by a single teacher educator. Some other functions of questioning as indicated by teacher educators were : it makes the subject matter clear (18%) helps the teacher to develop or advance with the lesson (8%) and introduce a new lesson or topic (7%). Only four teacher educators (5%) indicated that questioning could be used for the all round development of the child.

Thirty six teacher educators (47%) opined that teachers' questions serve an important purpose of diagnosing students'



difficulties. The responses reveal that questions are viewed as an aid for identification of problem areas of children. Only two teacher educators gave responses which seemed to indicate that an important purpose of teachers' questions is "to develop thinking ability and use knowledge in various situations." Though the number of responses is small it however indicates use of questions in generalizing and making inferences.

Though none of the teacher educators responded that one of the purposes of teacher questions was to guide pupils learning, this purpose was implicitly present in most of the responses. Analysis also reveals that not many teacher educators could readily provide three purposes served by questioning. Several of them listed only one or two purposes, which when analyzed, were placed in a single category. This is evident from the fact that only 129 ( $x=1.6$ ) responses were obtained which otherwise should have been 231 responses. This shows that perhaps many teacher educators have not considered carefully the purposes that may be served by questioning. Effectiveness of the use of questioning, however, depends on an awareness of various purposes that questions may serve and awareness of different types of questions for achieving these purposes.



### 3. *Use of questioning and instructional stages*

In response to the stage at which a teacher can use questioning as a device of teaching during instruction, 18 (23%) teacher educators stated that questioning can be used as an instructional device at all the three stages i.e. introductory or pre-instructional, instructional or developmental stage and post-instructional or review stage. Nine (12%) teacher educators were of the view that it could only be used at the introductory stage. Twenty (36%) eight responded that questioning could only be used during the review stage. Ten (13%) educators, however, opined that questioning can be used at both during pre-instructional and post-instructional stages. Three (4%) stated that questioning could be used only at the instructional stage. Nine (12%) teacher educators did not express their opinion on the use of questioning during instruction.

It is evident that teacher educators did not view questioning as a useful device of teaching which could be used at all stages of instruction. The analysis shows that review or post-instructional stage of instruction has been viewed as the most important stage for making use of questioning device. A possible explanation is that teacher educators had considered review, testing or evaluation of the subject matter as a very important function of questioning



and the corresponding review stage of instruction as the most significant for use of in the classroom. This also probably indicates that the role of the teacher is perceived as that of an evaluator of student's learning in the classroom, and not the facilitator of learning.

#### 4. *Questioning : levels and types of questions*

Teacher educators were asked to respond to the different levels of questions and to provide an example of each kind. Only nine teacher educators (12%) mentioned that the questions can be related to all levels : knowledge, understanding and application. Out of these only three provided examples of the three kinds of questions. As shown in the Table 6 there were only four (5%)

**Table : 6 Responses of Elementary Teacher Educators (N=77) to the different levels of questions.**

	<b>Levels</b>	<b>f</b>	<b>%</b>
1.	Knowledge questions, understanding questions, application questions	9	11.7
2.	Knowledge and understanding questions	4	5.2
3.	Knowledge questions	2	2.6
4.	Knowledge and application questions	1	1.3
5.	No response	9	11.7
6.	Incorrect response	52	67.6





teacher educators who mentioned the two levels i.e. knowledge and understanding. One teacher educator mentioned the two levels : knowledge and application, whereas knowledge level alone was mentioned by two teacher educators.

Analysis shows that teacher educators largely related structuring of questions to the level corresponding to the knowledge aspect. This is also supported by the observations made in the classroom across different subject areas. The questions asked by the teacher largely corresponded to the factual recall of the material, thus assessing only the knowledge aspect of the content. Application questions were minimal. Since 52 (68%) teacher educators did not respond to the level and types of questions, it further highlights the need to equip them with knowledge of levels of questions to help build the requisite skill in questioning. Literature (e.g. Davis & Tinsley, 1967; Gold bold, Chaudhari, 1975; Vats, 1990; Hamilton & Brady, 1991.) too has shown that classroom questioning is dominated by knowledge based questions.

When asked to provide examples of factual, conceptual and thematic questions, thirty eight (49%) teacher educators provided



examples of both factual and conceptual questions as shown Table 7. Thirty seven (48%) gave examples of conceptual

**Table : 7 Responses of Elementary Teacher Educators (N=77) to the types of question.**

S.No.	Type of Questions	Total Response f	No Responses f	Correct responses f	%
1.	Factual	59	18	38	49.4%
2.	Conceptual	57	20	37	48.1%
3.	Thematic	44	33	5	6.5%

questions only whereas five (7%) provided examples only of thematic questions. In contrast to the response to 'level of questions', it is seen that examples of factual and conceptual questions were provided by (65%) of the teacher educators. It shows that teacher educators were not able to relate the different kinds of questions to the level of thinking it stimulates. This further emphasizes the need to focus on questioning as a teaching device during teacher preparation.



## 5. *Form of question and its use in questioning*

In response to whether objective type (O.T.), short-answer (S.A.) or essay type (E.T.) questions were easy to use during questioning in the classroom, 77 teacher educators (71%) opined that all the three forms were equally convenient for use in the classroom. Twenty three (30%) however, responded that short answer type questions were the easiest to use.

**Table : 8 Responses of elementary Teacher Educators (N=77) on how to structure questions :**

How to structure Questions		f	%
1.	Simple language	18	23.4
2.	Level/needs/standards of children	10	13.0
3.	Should be objective	8	10.4
4.	Grammatically correct	1	1.3
5.	Should be short /brief	9	11.7
6.	Clear, concise, specific, pointed	13	16.9
7.	Not have answers like "yes" or "no"	2	2.6
8.	Students can answer without fear or hesitation	1	1.3
9.	Addressed to the whole class	1	1.3
10.	According to situations, material taught	3	3.9
11.	According to different levels, comprehensive, in a sequential manner, for provoking thought, from simple to complex	24	31.2

Responses of the teacher educators to the query whether questions should be addressed to the whole class or to an



individual student showed ambivalence in their views. As shown in Table : 8 forty four teacher educators (57%) responded that questions should be addressed to the whole class whereas 23 (30%) were of the opinion that questions should be addressed to an individual. Six however, did not express any opinion and four were not stated clearly. As evident, majority of the teacher educators were not aware of the advantages of addressing a question to the whole class vis-a-vis an individual. Studies (e.g. Jangira, 1981, 1983; Jangira & Singh, 1982) have shown that the process of delivery and distribution of classroom questions are important aspects of teachers questioning behaviour. A well structured question when appropriately delivered and addressed to the whole class helps teachers to secure and sustain pupil attention on the learning task and ensures their participation in classroom transaction.

## 7. *Structuring classroom questions*

In response to the question : "How should questions be structured for use in the classroom?", twenty four (31%) teacher educators reported that questions should be framed at different levels to serve different functions i.e. lower order to higher order. They also expressed that the level of thinking a question generates





is one of the most significant aspects of questioning. Eighteen (23%) responded that use of simple language is important for phrasing questions. Thirteen (17%) stated that questions should ask for clear, concise, and specific information. Ten (13%) teacher educators expressed that questions should be formulated according to needs and level of the children. Nine (12%) said that questions should be short/brief and eight (10%) teacher educators gave objectivity as an important component of structuring questions. Other responses given were "grammatically correct", not to have "yes" and "no" answers", "students can answer without fear or hesitation" and "according to situations, material taught". Research (e.g. Chaudhari, 1975; Dillon, 1982; Jangira & Singh, 1982) too has shown that characteristics such as relevance, precision, grammatical correctness and the level of thinking a question generates in the pupils are considered valuable in framing quality questions.

#### 8. *Quality of question and stimulation of thinking*

To arrive at teacher educators' understanding of the cognitive correspondence between level of question and level of student's answer, they were asked to respond to the question, "How the quality or different levels of a question were related to



corresponding level of thinking in pupils?" The responses of the teacher educators present a dismal picture. Only two (3%) of the teacher educators stated that higher level questions as compared to lower level knowledge lead to higher level of thinking which aids in development of intellectual skills. The responses given were "good questions inspire students to study further", "evoke intellectual curiosity", and "help develop reasoning". The direct correspondence between level of questions and students thinking was not commented on by a large number of teacher educators. Analysis shows that responses of the teacher educators to both the significant components of effective questioning i.e. awareness of various functions of the different purposes of questioning and awareness of different levels of questions were inadequate. There is enough research evidence to show the way a question is structured communicates the intent for which it is asked and accordingly stimulates pupils' thinking. Responses of the students provide a clue to the thinking level which the question has generated in them. Studies (eg. Gallagher & Gallagher, 1965; Cole & Williams, 1973 etc.) reveal that questions can be structured at different levels which generate thinking at corresponding levels in



pupils. This highlights the need to build-in and strengthen the component of questioning in teacher training programmes.

#### 8. *Inputs needed for effective questioning*

On inquiring about the specific areas which could help the teachers towards effective questioning in the classroom, varied responses were received. Sixty two (81%) teacher educators desired to know about level and type of questions. Inability to understand the different levels and types of questions is perhaps one of the bottle-necks for making effective use of questioning in the classroom. This also explains why queries related to type and level of question did not evoke the intended responses.

Some other related areas of questioning on which the teacher educators like to know more were : frame and use of questions, type of questions which should be asked at different stages of instruction, questions which help foster thinking including creative thinking, technique of questioning, language of questions and management of students' responses. All these mentioned aspects relate to the structuring of questions.



## ***Major Findings***

It can be concluded from the responses given by the teacher educators that :

The function of questioning was largely related to reviewing progress and assessment of students' learning. Evaluation of students seems to be an important criteria being assessed through questioning. However, a small number of teacher educators opined that questioning can be useful in identifying problem areas of students for remediation.

Teacher educators by and large could only provide examples of knowledge based questions. A large majority of them chose not to respond to the query regarding level of question.

Teacher educators seem to hold ambivalent views regarding use of questioning during the different stages of instruction. However, the post-instructional stage was largely viewed as the most significant stage for use of questioning. Significance of questioning during all the three instructional stages was not evident in their responses.





Maximum number of examples provided by the teacher educators related to factual questions. Responses showed overlaps between conceptual and thematic questions.

Teacher educators opined that objective type questions were the easiest to use followed by the short answer type. This may be due to the fact that objective type questions are short, brief and to the point as compared to short answer type questions.

Teacher educators opined that the question should be addressed to the whole class as towards an individual student. According to them it leads to greater attention and participation by all students.

Teacher educators were unable to explain the relationship of the level of teacher questions and level of thinking evoked in the student.

In sum, it is evident from the responses received that by and large teacher educators are not very conversant with the nature and scope of questioning skill nor are they familiar with effective use of questioning as a device for teaching. This highlights the need to develop in teachers and teacher educators clarity about the basis of questioning, type of questions to be used and the skill in delivery of questions. This has implications for teacher preparation



and training of inservice teacher educators in questioning skill. In this light preparation of exemplar material on questioning for use teacher and teacher educators would go a long way to improve their questioning skill. Hence, for effective implementation of questioning skill by teachers acquaintance with types and functions of questions, appropriate methodology of using relevant questions in a given context, for a specific purpose and at appropriate stages of instruction to evoke intended responses is essential. This is the focus in the following sections.



## V

### A GLOSSARY OF QUESTIONS

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***"Definitions, like questions and metaphors are instruments of thinking. Their authority rests entirely on their usefulness, not their correctness."***

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***(Postman, 1979)***

#### ***What is a Question?***

The term "question" has been defined in many ways and different assumptions are made about the meaning of the term. Question is considered as an expression of an "instinct of curiosity", "desire for order and connectedness", "attempts to get justification of commands", desire to know, desire for social contact, an interrogative statement and so forth. Questions have been seen as illustrative of curiosity defined as "an activity attitude very much like interest". A question implies recognition of some pattern and "something" missing from it (Hogdin, 1976); is an incentive for solving a problem or removing an obstacle (Piaget, 1946). Commenting on the fundamental nature of question Cohen (1929) discussed it as a "logical entity"; a prepositional function set in words with a variable (who, which, what, why and so forth) substituted for some constant. According him,



“questions are variables whose values are answers”. However, the common elements of the various explanations given of a question relate to :

- a) an element of confusion,
- b) an awareness of a lack of specific information,
- c) a realization of gaps in relationships, and
- d) an element of curiosity.

Questions have also been discussed synonymously with problems. The relationship suggested is that a problem may produce questions and questions as representing potential problems. According to Woodworth (1922) the question is an “interest in a definite form”, originating in curiosity arising out of a particular experience. It serves to prepare the individual for reception of the answer and exclusion of what is irrelevant.

A question is also viewed as a form of utterance by means of which one calls upon a listener to reply i.e. to produce on his turn an utterance upon which one may proceed to further action. A speaker asks a question when in doubt i.e. he suspends further action until the listener has provided an answer. In this view questions, are a means of bringing social co-operation to bear upon actual or potential physical action. It suggests that the individual, instead of imagining or “reasoning” in solitude, brings others into discourse with him, and secures the benefit of their experience and understanding. This kind of discourse is the realm of question and answer, a realm in which the most significant human interaction takes place.





## ***Classification of Questions***

In general, classification gives expression to the manner in which we conceive the world, and it provides a framework for our thinking and acting within it (Koerner, 1970). According to Dillon (1984) a classification reveals not only the particular characteristics of the question but also the category of the phenomenon in question; it permits knowing further about the question by force of having known one thing about it. What comes to be known of a question is : (i) the generic question of which it is a particular variant, (ii) category of things constituted by the generic question and (iii) the relation between the question and other questions of that kind, other generic questions and other categories of the phenomenon in question. The uses of classification find place in the understanding, practice and pedagogies of inquiry. These can guide teachers to know :

- the different kinds of question
- the nature and functions of question
- the level of thinking it promotes

Attempts have been made to develop set of categories describing the types of questions asked by teachers in the classroom. A number of classification systems for classroom questions have been reported. Gagne's (1965), Bloom's (1956), Sanders' (1966), Guilford's (1967), Gall's (1973), Riegle (1976) and so forth. Most of the systems consist of a limited number of general categories which can be used to classify questions irrespective of such factors as subject-matter, area, grade, level etc. Some systems, however, have been developed with a specific



curriculum in mind. For example, Guszak's (1967) system classifies questions that teachers ask elementary school reading groups; Schreiber's (1967) system classifies social science reading groups; Wilson's (1969) statement classification system; Clements (1964) system was designed to classify questions asked by art teachers. However most of the question-classification systems are composed of categories based on the type of cognitive process required to answer the question (Gall, 1973).

The most representative and popular cross-subject classification system (Cognitive Taxonomy) was developed by Bloom, Engelhart, Furst, Hill & Krathwohl (1956). Bloom's classification system is developed on the educational-logical-psychological principles and it best represents the commonalities that exist among classroom question classification systems (Gall, 1970). Bloom et. al. (1956) using thought processes as the basis, developed a hierarchy of educational objectives with six levels ranging from the simplest to most complex cognitive processes : knowledge, comprehension (understanding), application, analysis, synthesis and evaluation, arranged in hierarchical order. Each category or level subsumes the ones below it, thus depicts a sequential cumulative categories of thinking from knowledge to evaluation. Each level includes and depends upon the abilities in the categories lower on the list. For example, mastery of an objective in the application of knowledge will require:

- (i) knowledge of facts involved,
- (ii) understanding the relationship between the facts in a given



- situation,
- (iii) application of this understanding to a new situation (Harper, 1990).

Bloom's Taxonomy provides a framework for teachers to develop questions at various levels. To facilitate teachers' understanding of the different levels of questions an example of each category of question is given in Annexure - II.

In view of use of questions as pedagogical tools, classification of classroom questions is an important technique that can be used to improve teacher's questioning skills (Riegle, 1976). This gains significance in view of the fact that the ultimate responsibility for providing instruction in accordance with the level of the students and the learning objectives rests with the classroom teacher. It is, therefore, important for teachers to know the different ways in which questions have been classified.

In general, classroom questions are classified according to the use to which they are put. Sometimes they are classified according to the form and wording in which they are presented. It is also seen that questions have been classified in varied ways by different authors and have been given various names. Many questions may have different names for a similar function, for example the 'divergent' and the 'interpretative' question; the 'choice' and 'spoon-feeding' question or 'testing' and 'memory' question. Some umbrella terms like 'narrow' or 'structured' question covers questions such as: the 'convergent', the 'cognitive memory'; likewise the 'broad' or



'unstructured' question covers 'divergent' and 'evaluative' type of questions and so on. Therefore to ask an effective question it is important to know the kinds of question that can be asked for different levels of thinking as well as the purpose served by each kind of question. Reviewing literature on questioning showed a wide, varied and a huge breadth of terminology of questions. Therefore it becomes pertinent to familiarize teachers and teacher educators with different terms and types of questions and their definitions. In order to make the term more understandable an example of the specified question is also provided, however the order of given questions is neither suggestive of hierarchy nor of quality. In the discussion that follows, in the beginning Bloom's taxonomy has been made the basis for the classification of questions.

**1. Higher order Questions.** These belong to the last three categories of 'Bloom's Taxonomy' and require analyses, synthesis or evaluation. These demand more complex and thus higher levels of thinking.

i) *Analysis questions.* These involve examining materials, situations or environment with a view to spilt them into their component parts. Here both inductive and deductive reasoning are needed e.g. Why does the candle blow out when a closed container is placed over it. Analysis type questions can further be divided into three types:

a) *Analysis of elements.* It requires students to diagnose materials, situations or environments and separate them





into their constituent parts eg. What do you think was the poet's aim in writing this poem?

b) *Analysis of relationships.* This category directs students' attention to relationships between different elements envisaged in the preceeding stage of analysis e.g. Does the evidence support the generalisation that women are not equal? Support your conclusion from the information you have used.

c) *Analysis of organisation principles.* This category envisages the student's grasp of the communication as a whole, the gestalt of the situation, e.g. "Education of a woman is education of the family." How do you think the author arrived at this conclusion?

ii) *Synthesis.* These call upon the student to combine or recognize specifics so as to develop a new structure or generalization. These questions help in fostering creativity in children eg. Suggest a theme representing the different cultural programmes to be put up by the school?

iii) *Evaluation.* These ask students to determine how closely a concept or idea is consistent with standards or values. eg. What significance has the governments' decision to opt for increase in number of working days for the working women?

**2. Lower-Order Questions.** These belong to the first three categories of 'Bloom's Taxonomy' and are those which ask for knowledge, comprehension and application. These are defined as



demanding less complex, and thus 'lower' level of thinking, e.g.

- i) *Knowledge questions.* These ask students to perform simple recall e.g. How many students are in your class? How many chapters have we completed in English?
- ii) *Comprehension questions.* These require the student to produce evidence that he/she understands a point e.g. What are the cells of an onion peel like?
- iii) *Application questions.* These ask students to select facts, principles, and/or generalizations and apply them to a particular problem. They require application of some understanding, technique or principle to a problem situation and involve higher levels of thinking. e.g. Considering the climatic conditions of Rajasthan, what type of crops can be grown there?

3. ***The Closed questions.*** In these, the response that the student is allowed to make, is predetermined. The closed question is useful for testing recall, focusing attention and to proceed on with the lesson avoiding discussion. It does not require much to be added on the part of the student, hence, is helpful for reluctant learners. The closed question can be:

- i) One which asks for a short, right answer. e.g. When did India become a Republic?
- ii) One which is answered in 'yes' or 'no' and makes use of interrogatives like : 'Is it?' 'Have you ?', 'will you? etc. e.g. Have you brought your English reader?



**4. The Open ended or Unstructured questions.** These are open to many answers, unexpected responses or effects can be revealed and the respondent's frame of reference, knowledge and/or experience can be detected, eg. Why do you think people steal? Why should we plant trees?

**5. Structured questions.** These test students' understanding of specific subject matter, principles, or concepts and permit a greater degree of objectivity in the assessment of answer because they generally elicit a short answer, and are easier to mark than open-ended question e.g. How many planets are there in the solar system?

**6. Narrow Questions.** These questions have one specific response and have no scope for a variety of responses. eg. What is the capital of India? These type of questions are categorized as (A) cognitive memory questions and (B) convergent questions. These are :

(A) *Cognitive memory Questions.* These are limited to the lowest level of thinking. These call for answers that are a reproduction of a fact, definition, or other remembered information i.e. are directed towards retrieval of information from the memory. These may be :-

- i) *Recall Questions.* These refer to the mental process of reproduction of information, facts, generalizations as originally encountered by the learner, e.g. What were the social evils that Ashoka curbed?
- ii) *Identity/Observe Questions.* These question are useful for collection of data which form the bases of higher



mental processes of drawing inferences and generalizations, e.g. Amongst the different activities listed by you pertaining to farming, select/identify those that pertain to the cultivation of soil?

- iii) *Yes or No Question.* These questions are useful for collection of information, facts, etc. based on direct and vicarious observations of the learners. e.g. Have you seen a shooting star?
- iv) *Define Questions.* These require recall of the definitions of the concepts. e.g. Define gravity? How will you define a noun?
- v) *Name Questions.* These call for recall or identification of the names of objects, events, phenomena, processes, etc. e.g. What do you call places surrounded by water?
- vi) *Designate Questions.* The ability to designate relates to conceptual development and operates at understanding level teaching albeit at lower level. eg. Give an example of a substance that dissolves in water?

B) *Convergent questions.* These questions are also narrow questions, but they are broader than cognitive-memory question because they require the respondent to put facts together and construct an answer. They require the application of a rule of procedure by the student for obtaining a single right-answer. These are narrow because there is usually one 'best' or 'right' answer. These are :





- i) **Explanation Questions.** These refer to the ability of making concepts, ideas, phenomena etc. intelligible, e.g. Why does a cork float on the surface of the water?
  - ii) **Relationship Questions.** These refer to the ability of perceiving connections, both obvious and implied, between concepts, ideas, events, institutions, phenomena, trends etc., e.g. How are agricultural industry and service sectors related to one another?
  - iii) **Compare and Contrast Questions.** These require the ability of showing similarities or dissimilarities between objects, events, concepts, ideas, institutions etc., e.g. Distinguish between capital and wealth? Or income and salary?
7. **Detail Question.** These demand a lot of information . e.g. What led to the struggle for independence in India?
  8. **Easy Question.** Questions which most people/pupil's can answer. e.g. What does the sun give us?
  9. **Thought Questions.** These demand rigorous logical operations such as explaining, evaluating, or comparing and contrasting. e.g. Why is it important to protect wild life?
  10. **Explanatory Question.** Require further meaning or reasons that will help students understand a concept, idea, task or procedure. These are of five kinds :
    - i) **Causal explanation Questions** Give events, situations or states to be accounted for and asks that a state of affairs to be cited of which the event (situation or state) is taken



to be the result. e.g. Why does iron rust in water?

- ii) *Normative Explanation Question.* Involve verification or justification by citing of rules, common usages or conventions. e.g. Why don't we classify frogs as fishes?
- iii) *Teleological Explanation Question.* Call for statements of purposes, functions or goals as justification for actions, decisions or a state of affairs, e.g. You said you wanted to become a doctor. What reasons can you give for your choice?
- iv) *Sequential Explanation Questions.* These require that a sequence of events be cited of which the event to be accounted for, is the end point eg. How was the discovery of penicillin made?
- v) *Procedural Questions.* These require description of the steps or operations by which a given result or end is attained, and are in the form of managerial tasks, e.g. How did you get the answer  $416+4$  or Try again and check if you get the same answer?

**11. Subsidiary Questions.** These seek to clarify the meaning of the initial question and facilitate a more adequate response. e.g. What facilities would help farmers for irrigation? Do you think providing free electricity would help?

**12. Fact Questions.** Demand specific information, and seek specific, factual information. They also seek the students' awareness/knowledge about a particular topic, e.g. What is



the capital of India?

13. **Opinion Questions.** These seek opinions on complex issues where there is no clear - cut response, e.g. What happens if a country is politically unstable? What happens if a woman is made a Sarpanch of Gram Panchayat?
14. **Choice Questions.** It requires only a 'yes - no' or 'either' or 'or' response .eg. When do you want the test, Friday or Monday?
15. **Thought - provoking Questions.** These provoke thought regarding an event, makes students reason through a conclusion or explain something at length, eg. How are clouds formed?
16. **Rhetorical Questions.** These are questions to which no reply is expected, their purpose is to give emphasis. These are of three types :-
  - i) *Imperative questions* - are sentences with an interrogative form but an imperative function, e.g. Will you open the window please?
  - ii) *Declarative questions* - are sentences with an interrogative form but a declarative function, e.g. Is that the way to treat a law - abiding citizen?
  - iii) *Exclamatory questions* - are sentences with an interrogative form but an exclamatory function, e.g. Is that necessary?
17. **Natural Questions.** The questioner wants to elicit some information and for that purpose makes a query. e.g. Do you



know how much of earth's surface is covered with water? Do you know Jupiter has more than one moon?

**18. Formal Questions.** These are those in which the questioner already knows about the information asked for. These can be further divided into two types - (A) testing question and (B) teaching question.

**A) Testing Questions** - assessing the knowledge of the student at the different stages of the lesson, either orally or in written form. These are :

i) *Preliminary or introductory, Questions* - these are generally asked at the beginning of a lesson in an attempt to test pupils previous knowledge, as to gauge what he knows regarding the particular topic to be taught, e.g. Before beginning a chapter on water, the teacher asks - What are the common sources of water?

ii) *Recapitulatory Questions* - these are asked at the end of each section in a lesson as well as at the end of a lesson to ensure grasp of knowledge.

**B) Teaching or Developing Questions** - these are asked by the teacher in the course of a lesson, they help the teacher deduce new principles, elicit information and impart new knowledge, e.g. Before starting the topic of 'Man' the teacher asks about the evolution of man.

**19. Stimulating Questions.** These arouse the interest of students and challenge their thinking. These are important in obtaining





the attention of the class, e.g. While teaching the lesson on Earth, narrating the fact that scientists believe in another galaxy and existence of another planet that is at the same distance from the sun as our earth, the teacher can ask - Do you think life would be possible on it if similar conditions prevailed on the planet as earth?

**20. Trivial Questions.** These do not reflect any thought, and side track the lesson into by - paths. Such questions are frequent and reflect immaturity or superficial preparation of the teacher. e.g. What did you have for breakfast today?

**21. Ambiguous or Indefinite Questions.** These are not easily understood, are vague and leave the pupil in doubt as to what the teacher is arriving at, e.g. How would you explain man's existence on earth? These are further of two kinds:-

i) *Functional Questions* - there can be interpreted in two or more ways functionally (i.e. as the various form of rhetorical or as interrogative), e.g. Why don't you do it this way?

ii) *Semantic Question* - that can be interpreted in two or more ways semantically, eg. Explain the Civil War?

**22. Broad or Divergent thinking questions.** These provoke independent thought and assist students to find answers for themselves. These permit a variety of acceptable responses and involve the operations of predicting, hypothesizing, inferring and reconstructing and encourage both concrete and abstract



thinking. These are of four kinds :

- i) *Hypothesize Question* - is a supposition/conjecture which has every chance of being proved as a cause/factual happening, e.g. Is the achievement of students related to teachers' experience?
- ii) *Predict Questions* - these refer to the ability of projecting a consequence or visualizing an outcome in a proposed situation, e.g. What will be India's position with regard to population in the next ten years?
- iii) *Infer Questions* - these aim to draw/desire possible conclusion on the basis of given data along with formal validation, e.g. The economic data of the state of Bihar is given, the students can be asked to calculate the per capita income.
- iv) *Reconstruct Questions* - require student's sensitivity in expressing ideas and images and in reformulation of overall view of the existing structure, eg. What measures can be taken to educate people regarding control of population in India?

**23. Evaluative questions.** These require the person to judge, value, justify a choice or defend a position against some criteria. Evaluation can be in terms of internal evidence as well as external evidence.

- A) *Internal Evidence* - e.g. of Which of the statements given after the lesson explains that this is a highly functional model of solar energy?



B) *External evidence/criteria* - e.g. Is science a boon for mankind?  
How?

Evaluative questions are of four types :

- i) *Judgement Questions* - require judgement over matters of facts, eg. Will reducing the birth rate be sufficient for bringing about economic growth?
- ii) *Value Questions* - require judgement over matters of value, eg. Is racial segregation a good practice for ensuring equality of education for all races? (Value : Racial segregation).
- iii) *Defend Questions* - require arguments based on some criteria for defending an action or a system or an institution or a position that one takes over an issue, eg. Does the crime rate increase in a country when it is politically unstable? Are there more cases of theft in a state which is poor?
- iv) *Justified - choice Questions* - require justification for a particular choice out of the given two or more alternative courses of action, e.g. Which type of government is the best for our country, parliamentary or presidential?

**24. Confusing Questions.** These include too many factors for the student to consider at one time thus causing confusion. eg. How, when and why did the war of Independence begin?

**25. Spoon - Feeding Questions.** These give too much guidance to a response, eg. What in the green plant helps to make food with



air, water and sunlight?

**26. Contextualized Questions.** These promote reasoning and deep thinking by fostering contextualized answering of questions either individually or collaboratively. These are of four types :-

- i) *Interpretation Questions* - Ask the student to drive the essential meaning of a communication; to describe the significance of a particular sign, symptom or event. Asking students for explanations fosters deeper levels of thinking e.g. Industries are being closed to check pollution. What affect will it have on the common man?
- ii) *A Causal Antecedent question* - ask the learner to identify the causal events that led to the current state. e.g. What are the possible factors responsible for poor health of children?
- iii) *Causal Consequence Questions* - ask students to predict the consequences of an event or state. The learner must also justify their prediction by explaining why they believe the result will occur. These help to make connections between empirical information and causal mechanism e.g. What will cutting down of forests lead to?
- iv) *Expectational Questions* - ask why a specific event did or did not occur. This might logically follow a causal consequence question as a student is asked to reconcile their predictions with actual events. e.g. There is increase in population, still we have not faced any famine. Why?





- v) *Enablement Questions* - ask what objects, agents or processes allow some action to be performed and how they accomplish their actions. e.g. If you do not have house, what will you do to save yourself from rain?

**27. Interrogative Questions.** These are sentences with interrogative function regardless of form i.e. requests for information . These are of five types:-

- i) **Empirical Questions** Are about the world and our experiences of it. These further include:
  - a) **Causal Questions** about the cause of something, e.g. What should we do to eradicate polio?
  - b) **Teleological questions** - about someone's purpose aim or goal, e.g. Why has India not signed CTBT yet ?
  - c) **Functional questions** - about something's function, e.g. How does exygen reach the blood stream in man?
  - d) **Non-normative judgement** - requests for an estimate prediction, ranking or grading, but not value judgements, eg. Who will win the election?
- ii) **Analytic questions.** Are about the relationships between verbal, logical or mathematical symbols. These include :-
  - a) **Linguistic** - requests for definitions or the relationship between words, e.g. What does ambiguous mean?
  - b) **Logical**-requests for the laws of logic or the relationship between logical symbols, e.g. Why is this argument invalid?



- c) *Mathematical* - requests for the laws of mathematics or the relationship between mathematical symbols, e.g. Can you show that  $20 \times 4$  is a kind of addition?
  - iii) *Normative (Value) Judgement* - requests for evaluations obligatory judgements or justifications, e.g. Is Mr. X better singer than Mr. Y?
  - iv) *Preference* - questions about likes and dislikes, e.g. Which food item do you like most?
  - v) *Metaphysical* - questions about supernatural beings, events etc which do not have agreed upon method for arriving at an answer e.g. Are there ghosts?
28. **Naive Questions.** These address the content of the study, use specific language and are based on faulty assumptions, e.g.
  29. **Short answer Questions.** These address the content of the study, can be answered in “yes” or “no” or with a single statement, e.g. Does the President pay taxes?
  30. **Researchable Questions.** These address the content of the study use specific language, their answers require explanation, can be answered using accessible resources e.g. How did Delhi become the nation’s capital?
  31. **Discussible Questions.** These address a key or “fundamental” issue and aim to bring out points not mentioned in the fact e.g. Was it desirable to reduce the voting age from 21 to 18 yrs?
  32. **Clarification Questions.** These questions request clarification of information, procedures, comments or tasks provided by the



teacher or others, e.g. Do we have to present the work in groups or individually?

33. **Confirmation Questions.** These seek confirmation of a completed student response, procedure or task, e.g. Have all the students completed their experiment?
34. **Non -task curiosity Questions.** These display academic curiosity, but curiosity that is not related to the immediate task. e.g. Who received The Jnanpith award this year?
35. **Diversion Questions.** These questions or comments are intended to divert the teacher's or others' attention from the task at hand, e.g. Maa'm Rohit is troubling me. Do you think we will get winter vacations this year?
36. **Affective Questions.** These are in the form of giving an opinion, not necessarily based on any criteria, e.g. Did you enjoy reading the story?
37. **Creative thinking Questions.** These invite students to act or think upon their own initiative to seek, instead of receive knowledge, and to rely upon their own resources thus foster creative thinking eg. In how many ways can you get the number 12?
38. **Reproduction and translation Questions.** These are convergent in nature, check factual recall and recognition, or 'reproduction' of information and the 'translation of the original meaning into another form, eg.
  - When did Vasco da Gama first reach Calicut? (Recall)



- Farmers in northern India grow large quantities of
  - a) Potatoes                      b) Wheat      c) Corn (Recognition)
- Prepare a line diagram showing the evolution of aviation since 1900 (Translation)

**39. *Reflection and Valuation Questions.*** These produce answers beyond the information given in the form of analysis, synthesis, application, hypothesis, prediction and generalization as well as those dealing with matters of rating, value and judgement e.g.

- What do the facts relating to the scriptures of Mohen-jodaro and Harappa indicate about their ways of living? (Reflection).
- Is life for the farmers during better the present times as compared to the olden times? (Valuation).

**40. *Scientific Questions.*** These carry a great deal of weight in shaping the direction of a sequence of thought, e.g. Why does an object fall towards the earth?

**41. *Affirmative Questions.*** These are known as first order questions, e.g. Is it true that Sheetal possesses a great deal of will to achieve?

**42. *Recognition Questions.*** These present the student with cues that require only the selection of the correct option from two or more choices, e.g. Is wool warmer or cotton?

**43. *Translation level Questions.*** Indicate the change of communication from one medium to another or from one form





to another in the same medium. Questions requiring this operation are known as translation questions eg.

- What does this picture represent (medium)
- How can we represent the feeling of 'joy' of the child in a picture? (medium)

Classroom observations have shown that during classroom interaction the students are called upon to perform a range of logical operations in response to the questions posed by the teacher. These logical operations can serve as bases for formulating questions to stimulate the classroom environment and to have active involvement of the students. Twelve categories of logical operations have been identified and are characterised as :-

- i) *Describing* - requires an account of something which has been mentioned or suggested. These include:
  - a) *Requests for properties/ characteristics* - e.g. What colour is it?
  - b) *Requests for classifications*, e.g. What class of animals does the cat belong to?
  - c) *Requests for labels or names*, e.g. Name the part of the plant which produces food for the plant?
  - d) *Requests for examples*, e.g. Name a substance that dissolves in water?
  - e) *Request for summaries*, e.g. Give a summary of the chapter?
  - f) *Request for reviews*, eg. What have we said so far?



- g) Request for procedures and processes e.g. How is wheat sown?
- h) Request for chronological sequences, e.g. List in chronological order the events leading to World War I?
- i) Request for relationships, e.g. How is spelling ability related to writing ability?
- j) Request for comparisons, e.g. What do these words have in common?
- k) Request for contrasts, e.g. What is the difference between living and non-living?
- ii) *Designating* - Something has to be identified by name - a word or a symbol, e.g. Can you recall the name of the author? Give an example of a substance which dissolves in water?
- iii) *Stating* - Statements of issues, steps in proof, rules, conclusions, or a state of affairs are asked, e.g. What is the conclusion of the chapter?
- iv) *Reporting* - A request is made for a report to be given on information contained in some source such as a textbook or for a review or summary of this information, e.g. Did your book say any thing about Indians?
- v) *Defining* - The meaning of words or terms is asked implicitly or explicitly, e.g. What is an E-mail?
- vi) *Substituting* - The student is asked to perform a symbolic operation, usually of a mathematical nature, e.g. Multiply 45x4.
- vii) *Classifying* - requires explicit reference to be made to an



instance or class (type, sort, group, set, kind) of things or both.

A given instance is to be put in the class to which it belongs, or a given class is to be placed in a larger class, e.g. What group of animals does the dog belong to?

- viii) *Opining* - The student is required to express his belief or opinion about what is possible, what might have been the case, what could it be in future etc. and makes an inference from evidence rather than a report of single fact. e.g. Is smoking injurious for health?
- ix) *Comparing and contrasting* - type of initiating statement is usually marked by the presence of such words as 'difference between', 'differ from', 'be different', 'compare', 'like', 'correspond'. e.g. Is the state the same as the government? How is a fish different from a frog?
- x) *Explaining* - gives a particular consequence and requires that an antecedent be supplied, e.g. Why did the burning candle go out? The consequent event is "the light goes out". The question asks the student to give a reason to account for the fact that the light is out. The reason is the antecedent.
- xi) *Conditional inferring* - a prior condition is given and a consequence is asked for, or both the prior condition and the consequence are given and the student is asked to affirm or deny prior condition e.g. If a train covers seventy kilometres in one hour and goes for five hours, how far does the train go?
- xii) *Evaluation* - these require evaluation of an object, person,



expression, event, action or state of affair where one is able to see both positive as well as negative points. e.g. Is it a good book? Is it sensible to go on a strike?

It is evident that questions can be categorised in various ways, performing different functions. This glossary of questions is an attempt to familiarize teachers with the vast variety of questions knowing their names, functions that they perform, with the hope that it would make it easier for the teachers to formulate and analyze their own questions. The first guide in asking any questions is to think about, how the question will help engage the students to think (Morgan and Saxton, 1991). The next section talks of the nature of classroom interaction, guidelines for structuring questions, what to avoid in questioning, and how to question.





## VI

### WHY AND HOW OF QUESTIONING

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*"To know how to put a good question is to have gone a long way towards becoming a skilful and efficient instructor".*

*(J.G. Fitch, 1901)*

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Postman (1979) suggested that questioning was as much a language art as reading and writing but it continues to be neglected. In the development of intelligence he writes, nothing can be more "basic" than learning how to ask productive questions (1979 :140). Teacher preparation, touches upon the questioning skill in theoretical terms, rather than dealing with the practicalities of classroom interaction, that is involving student- teacher participation. As one of the components of teaching methodology, classroom question making and question asking remain an insignificant aspect of instructional interventions. Research has shown that whatever little questioning takes place during teaching, it often lacks the intended impact and vitality in developing among students the approach to learning creatively.



It is the classroom interaction which sets students into the process of inquiry (thinking, feeling, discussing, etc.) and most often, the teacher is the initiator of the action. The place of the teacher is central as a guide to effective learning (Bruner; 1986; Vygotsky; 1986). A good question is often the key to effective teaching-learning interaction. Questioning generates the kind of communication which can lead to learning, reveals the student's readiness to the teacher, and establishes the ethos of the classroom. This sets the tone and provides direction to the quality of the learning. It also provides opportunities to students to organize their own learning (asking questions) and take responsibility for participating in controlling their learning (what ideas are introduced and developed). Therefore, to promote effective classroom discourse the teacher should enable the learners by:

- providing for shared contexts and experiences which build 'joint frame of reference',
- giving students practice in making questions and assessing their impact,
- providing opportunity to control and direct the exchange of ideas, and
- setting a rhythm and exploration within one self and with others.



The characteristics of such kind of enabling teaching-learning interaction are related to the.

- role of the teacher as a facilitator of learning and not a position holder of knowledge;
- establishment of a climate conducive for exchange and interchange of ideas, and
- organization of class so as to provide each one the opportunity to participate in the discussions.

It is with this background that the importance of good questioning needs to be appreciated and recognised by teachers in the classroom and by the teacher educators in teacher preparation which would enable them to:

- frame good questions, and appreciate the criteria for good questions,
- understand the purpose of question asked at different stages,
- decide when to put questions during instruction and why,
- ask questions relevant to students' experiences,
- how to ask questions to evoke the intended response from students,
- realise the consequences of a badly worded question,
- see the impact of good questions on students' learning,
- realise that students' responses need immediate feedback, and
- manage students' responses and their questions.



After discussing functions of questioning and characteristics of a good question, the remaining section provides guidelines for effective questioning in the classroom.

### ***Why do We Question?***

A question used in teaching always has some definite purpose. According to research evidence teachers spend 4/5th of their time in asking questions. The purpose of questioning in a classroom lesson may vary depending upon the context and the instructional phase of the lesson. Accordingly it could be to :

- explore the knowledge of students on the topic to be taught,
- awaken curiosity and create a learning set at the beginning of the lesson,
- stimulate interest, effort, and thinking at different stages of the lesson,,
- find out the starting point for a lesson,
- review students' learning to get feedback on their progress,
- diagnose specific difficulties in learning to modify the teaching-learning strategies,
- guide observation and thought or practical work,
- direct attention of pupils,
- develop a concept,
- test the factual information or the relations learnt,





- emphasize important content element,
- relate new knowledge with the previous ones,
- expose and resolve difficulties,
- test students' ability to use their knowledge,
- advance the learning task with the use of probing questions to enrich students experiences relating to the learning task at hand, and
- evaluate students' learning outcomes at the end of the lesson in terms of specific instructional objectives, or competencies to be developed.

Questions also serve the purpose of developing a line of thought. By means of questions, the pupils in the class can be led from one point to another, and can be stimulated to think for further learning. This helps children to be sure whether they really understand what they are doing or not. Besides this, questioning is helpful in creating, developing, and maintaining a good emotional and intellectual atmosphere as well as a high level of effort in the classroom. In order to develop questioning skill among teachers for bringing fruitful interaction between students and teachers, it is necessary to equip them with requisite 'knowledge' in asking and using questions related to the aspects like the following :

- Context of questioning : Setting in which a question is asked.
- Purpose of questioning : Intended learning outcome.



- Basis of questioning : Nature and type of questions.
- Methodology of questioning : Mode and efficiency in distribution and delivery of questions.

The art of questioning involves not only the ability to frame and deliver good questions, but it also involves responding. Each of these are examined in details hereafter.

## ***Functions of Questions***

Classroom questioning serves two functions, namely; the management and the pedagogical. The former is concerned with the management of learning environment during classroom instruction while the latter refers to the actual content, communication, and development of cognitive abilities. Management questions help the teacher in formulating and communicating specific directions for instructional purposes. For example:

- Are you ready for dictation?
- Take out your books and open at page 237.
- Am I audible to students at the back?

Some questions help to elicit information to ascertain the effectiveness of teaching. They also help to solicit relevant information about the learning environment. For example :

- Have you understood the meaning of the word 'tactics'?
- From the given passage give another word having the same



meaning as 'drizzle'.

Before the start of the lesson some warm-up questions can be asked in order to motivate students in the class. They also help to arouse curiosity and create the desire to know more. For example :

- Can there can be darkness during the daytime?
- Are there certain things which cause pollution inside the person? (Mind pollution/Bad thoughts)

Certain classroom questions refer to securing and sustaining pupils' attention on a task. For example :

- What did I say just now about the 'Solar eclipse'?
- Who would repeat Newton's third law of motion?

Pedagogic questions are those which help the teacher to develop, clarify, facilitate, and reinforce development of concepts besides helping to develop students' ability to interpret, apply, and think creatively. In fact, the content specific questions are used at different stages of instruction for various purposes while teaching a lesson. During the introduction of the lesson such questions can be used to link students' past experiences with the new learning tasks using the well known maxim, "known to unknown," to arouse students' curiosity and motivating them for the new learning tasks. Questions could be asked to create a desire to know more, build-up expectation, and stimulate imagination of the students.

At the development stage of the lesson probing questions can be



used to involve the learners for active participation and to enrich their experiences. Questions for stimulating students' thinking can be used at any stage of the lesson by posing problems relating to the learning task, calling for application of the acquired knowledge to new situations, or provocative questions to make the student think in new ways. Besides, questioning can be used for reviewing progress and diagnosing learning difficulties of students at the post-instructional phase.

Questioning can also help teachers to clarify students' values and thus focus on the affective elements of learning. These questions do not emphasise the values students hold but encourage them to assess their own value system and focus on the process to mould those values. Rath, Harmin and Simon (1966) developed a model to enable teachers to help students' clarify their thinking through a seven step questioning strategy namely : (i) choosing freely, (ii) choosing from alternatives, (iii) choosing thoughtfully and reflectively (iv) prizing and cherishing (v) affirming (vi) acting on choices and (vii) repeating. These seven steps according to Rath and colleagues support the development of a value. Based on this model an attempt is made to list some questions as exemplars to illustrate clarification of values at different levels. For example, if a student suggests that there should be no class tests, the following types of questions could be asked by teachers to clarify students' thinking.





(i) *Choosing freely*

- How long have you been feeling that there should be no class tests ?
- Is there anyone else also who thinks the same way ?
- Do you get low marks most of the time ?

(ii) *Choosing from alternatives*

- Did you consider any other alternative to class tests ?
- Since when have you been considering this idea ?
- What is the reason for this idea ?

(ii) *Choosing thoughtfully and reflectively*

- What is good about not having class tests ?
- Does it imply that students would have to study less ?
- What do you think this will lead to ?

(iii) *Prizing and cherishing*

- How important is the idea to you ?
- What will you gain out of this ?
- Do you think other students will appreciate the idea ?

(iv) *Affirming*

- Would you like to share this idea with you classmates ?
- Would you like to sign a written request to stop tests ?
- Are you willing to voice you opinion to the Principal ?



*(v) Acting upon choices*

- How can I help you with this idea ?
- What steps do you think need to be taken to make the idea feasible?
- How is it going to affect your life as a student ?

*(vi) Repeating*

- How do you plan to stress your idea further ?
- Would you convince other people to support your viewpoint ?
- Do you think it is worth spending time on this idea ?

Teachers can develop probing and clarifying questions at the different levels to enable students clarify their own values.

### ***Characteristics of a Good Question***

In view of the functions performed by the question in the classroom, the questions formulated by the teacher need to be of quality in the light of the characteristics of a good question.

Good questions make provisions for different levels of thinking. A question can be judged by its clarity, the way it facilitates accomplishment of goals set by the teacher, and provides for reflective and critical thinking. Therefore, the quality of a question is judged by the way it is phrased. Some of the characteristics necessary for a good question are stated below.

- Question should be concise.



- Question should trigger thought process.
- Question should not be ambiguous.
- Question should be in accordance with the age and ability of students.
- Question should evoke open response rather than single word or phrased response.
- Question should be worded in a manner so as not to suggest the answer.
- Question should avoid “yes” or “no” response, this introduces an element of guessing.
- Question should reflect a definite purpose.
- Questions should be directed to the whole class.
- Good questions reflect reason, focus, clarity and appropriate intonation.
- Good questions maintain students’ engagement, stimulate thinking, and evoke feelings.

Keeping in view the qualities of a good question it is desirable to provide guidelines for structuring quality questions.

### ***Guidelines for Structuring Questions***

Anyone can ask questions, but to ask them purposefully and effectively requires understanding, insight, and experience. The teacher’s effectiveness in questioning depends on an understanding



of various purposes that question may serve and an awareness of different types of questions for achieving those purposes. As Theodore Struck (1956) stated, "Good questions by their very nature, are educative, and they have a prominent place in all kinds of learning. If used in the right context, at the proper time, questions lead to new realms of understanding; they serve as means of organizing knowledge; of correlating the results of educative experiences; of tying together units of learning; and of intergrating personality". Certain guidelines for teachers for structuring classroom questions are given as under:

- i) In accordance with mental maturity of students : Depending upon the age group and previous learning experiences, questions must be comprehensible to the students and formulated at their mental level.
- ii) Encourage development of thought : The teacher can do this by paying close attention to the student who is speaking. Thought stimulation depends on the treatment the teacher gives to the response that has been made. Positive reinforcement is necessary for development of thought.
- iii) Meeting the students' needs : Questions used in teaching must involve all types of students, the under achiever, the average, and bright ones to ensure active participation of all the students. Therefore, distribution pattern of questioning must ensure this.





- iv) Allow appropriate time gap for reply : The time allowed 'wait time' should be enough to help all the students to structure their responses.
- v) Prefer single response questions : It is advisable to question on a single topic; avoiding multiple responses, by using one idea in one question. Avoid asking questions like "what building was constructed- where, by whom and why?" (all together)
- vi) The question should be stated clearly, and precisely. A pause given after the question is posed before naming the student helps to ensure that the whole class is paying attention.
- vii) Question at various levels : Questions may be set at different levels ranging from simple factual to problem solving requiring students' ability to apply the acquired knowledge to new situations. Questions should range from simple to the most complex
- viii) Encourage students to ask questions : Make them feel responsible to provide answers to the questions asked by their own classmates. Teacher should not be seen as final authority, shift responsibility to students as far as possible.
- xi) Avoid putting leading questions : The form of the question should not suggest the answer e.g., Does light travel faster or slower than sound? Since leading questions indirectly suggest the answers, this should be avoided so as to stimulate thinking.



## Example

### *Inappropriate*

Is it correct that air is necessary for germination of a seed.

### *Appropriate*

Why is air necessary for germination of a seed?

- x) Question must stimulate thinking : Every question must provide a challenge to the student to make him/her think, rather than simply reproducing the memorized textual response. Such questions should in fact evoke students' response exercising their ability to compare, interpret, reason, infer, etc.
- (xi) Always respond to children's questions : The teacher by responding, demonstrates his/her faith in each child's ability to ask questions. If their questions are ignored, children interpret this reaction of the teacher that they are incapable of asking "good" questions, that their ideas are not worthy. Such children stop asking questions and may even develop negative self-concept.

Structuring classroom questions includes the format of questions and the components of relevance, precision, clarity, grammatical correctness and level of thinking it generates in the pupils. How well a question conveys its purpose and how well it is phrased will be evident in the type of responses received when the question is asked.



## ***How Best to Question?***

It is also important for teachers to have for themselves guidelines regarding what to avoid in questioning and how best to question. Following guidelines would be useful :

The general guidelines for structuring of classroom questions was discussed in the preceding section. Specific components of structuring classroom questions i.e. quality of question, delivery of question and management of students' responses form the content of this section which are discussed now. While structuring questions for use in classroom teaching, the following points may be noted.

### *i) Content Specific*

Every question must be specific to the content and related to the instructional objectives of the lesson. Questions unrelated (completely/partially) to the content element lead to break in the continuity of the lesson, distract students' attention, and create confusion.

#### **Example**

1.   Teacher     :     What is an adjective?  
      Pupil       :     Adjective is a used to describe a noun  
                      or pronoun. (correct)
2.   Teacher     :     Find out the adjective in the sentence.  
                      I have a black pen.



- Pupil : Black (correct)
3. Teacher : Which is your favourite colour?
- Pupil : White
4. Teacher : I too like white colour.....

It may be noted that question number 3 is irrelevant to the instructional objective and drifts away from the main theme.

ii) *Precision in wording*

Every question must be precisely worded so that its meaning can be grasped quickly and the statement can be held in mind while formulating the response. This helps to avoid redundant responses from students. Use of redundant words, phrases or ideas make the question long and results in wastage of time and distraction of students attention. Brief, direct and straightforward questions are always better than extra worded questions. Concise/precise wording evokes the intended response from the students, and prevents the unintended responses, as illustrated below:-

<i>Inappropriate</i>	<i>Appropriate</i>
1. How do you account for downfall of the Moghul empire?	Give two major reasons for the downfall of the Moghul empire?





iii) *Unambiguous language*

It refers to clarity and understanding of the language that makes the intention of the question clear to the student.

Example

<i>Inappropriate</i>	<i>Appropriate</i>
1. What do you understand by the democratic system of a Government?	How is the president elected in a democratic set up like India?
2. What do you know about water pollution?	Give two causes of water pollution?

When a question is amenable to two or more interpretations, it loses its value. Choice of directional words and the phrasing of questions are necessary to ensure that ideas are clearly conveyed from the teacher to the student, and vice-versa.

iv) *Appropriate difficulty level*

Each question must be set at pre-determined difficulty level i.e., easy, average, and difficult depending upon the level of students to whom the question is addressed. Easier questions for low achievers to encourage them and build self-confidence, average questions for average students and more challenging questions from brighter students may be asked. Easier questions may be followed by average and difficult ones.



v) *Grammatical correctness*

When a question is not grammatically correct it creates confusion and students take more time to understand and respond. This reduces the fluency of questioning and students are not able to respond appropriately. Such questions may lead to wrong inference by the teacher about students' competence because the question fails to communicate its intent. Some of the sources of this type of error are (i) use of inappropriate and interrogative (i.e., first directional words in the beginning) questions, (ii) use of wrong tense, and (iii) use of double negative and difficult vocabulary.

**Example**

<i>Inappropriate</i>	<i>Appropriate</i>
1. Akbar was a great king. Is it correct? (Incorrect word arrangement).	Is it right that Akbar was a great king?
2. When did India got freedom? (wrong tense)	When did India get freedom?
3. Is it not incorrect that light is necessary for the germination of a seed? (double negative)	Is it correct that light is not necessary for the germination of a seed?

It is evident from the examples that inappropriate word arrangement, wrong tense, and double negatives mar the quality



and effectiveness of classroom questions.

Having known the general guidelines for questioning and the criteria of structuring a good question, it is also important to know what to avoid in questioning.

### **How Not to Question?**

- Irrelevant questions should be avoided. It is a waste of time to question students in an endeavour to extract from them the correct answers which they can really learn by only being told directly.
- Questions should not be heavily worded. It leads to difficulty on the part of the students to comprehend the content of the question.
- Questions should not seek too much from the students. Requiring a precise definition of a common article like a 'bat' or 'ball' may be an excellent way to stimulate thinking on the part of students, but to supply a precise answer is not an easy task.
- Questions should not be asked in the form of statement which is altered into a question by omitting a word and substituting a 'what'. For example : The highest mountain in India is what? Avoid echo questions. For example : Delhi is the capital of India? What is Delhi ?
- Avoid double barrelled questions : Questions requiring more



than two answers makes it complex. The demanding portion of such questions may also be missed by the student. These questions may be broken into two or more questions, each expressing a single idea.

- Questions should not be allowed to continue for long. A large number of questions over a considerable period of time leads to conditions of nervousness, tension, etc.
- The questions should not be rephrased or changed without sufficient reason; any change in the question disturbs the mind of the child and weakens promptness of response.
- Questions should not be asked in an attempt to probe or find out the feelings and other personal involvement of a student. Far from involving the individual, probing questions are said to be resented, feared and resisted, restrict interaction, circumscribe response, and encourage passivity.
- Question should not be asked in order to "make a point"- The point may be made in a straight forward manner by declaring it out right Thus, the student can immediately apprehend the point and respond directly to it, rather than trying to figure out what the point of the question is.
- Question should not be asked in an attempt to elicit from a student the (pre-question) thought which has occurred in the teacher's mind. In discussion, teacher often tend to put a ques-





tion in an effort to get the student to respond with the thought which is in the teacher's mind. Rather than doing this, the teacher can straight forwardly declare the thought in his mind, permitting others the opportunity to examine it, incorporate it into their own thinking or to reject it.

Having 'known how best to question' and what to avoid in questioning, the next phase is the delivery of question in the classroom.

### ***Delivery and distribution of questions***

Questioning is an art demanding specific skills and at the same time it requires-on-the spot spontaneous and quick decision to use a particular question. Besides structuring of questions it is also important that the questions are communicated in an appropriate manner to the students to elicit answers from them. This process of communicating the questions verbally to the pupils in the classroom is termed as the delivery process. After the question has been put forth to the class, the next step is to designate the pupil who would respond to the question. This is known as distribution aspect of classroom questioning behaviour.

The components of the delivery process are speed, tone and pause. Speed refers to the time taken to deliver a question.

- Speed should be in accordance with the student's comprehension and will also depend on the level of thinking required to answer the question and the function it is required



to perform. A higher level question requiring complex mental operations needs to be stated at a slower pace as compared to lower level questions requiring functions of memory or direct recall.

- Voice refers to the audibility and modulation, which is required for stating a question. The question should be, spoken in such a manner that all students including those in (back rows) in the class can hear it. Intonation specific words or phrases of a question emphasises the specific objective of the question and also transmits the level of thinking required to answer a question. Properly modulated or intonated questions create a learning set in the pupils and helps secure the desired attention of the class.
- Pause refers to the 'wait-time' i.e. the time given to the students to think and formulate an appropriate answer. 'Wait-time' serves an important function of communicating to the teacher, intention of the kind of answer and level of thinking stimulated in the pupils. Usually teachers give too short a pause irrespective of the level and function of the question. According to research evidence a pause of at least 3 seconds should be allowed after a question is asked.

The other aspect of effective questioning in the classroom is the distribution of questions, in terms of classroom space and



among volunteers and non-volunteer students. Distribution in space refers to the frequency with which questions are asked to students sitting in the front rows, back rows and left and right side of the classroom. It is generally observed that the students in the back rows are neglected and with time become passive towards teacher's questions and become indifferent to classroom transactions. Therefore to secure and maintain students' attention and active involvement in the teaching learning process, questions should be distributed evenly in different parts of the classroom.

It is also important to distribute questions among volunteers (show eagerness to provide answers) in order to involve the whole class and make teaching effective. A given question can also be redirected towards passive listeners (non-volunteers) to secure and maintain their attention and active participation in the classroom. Since a well structured question is ultimately to be effectively delivered and distributed in the classroom, the processes of delivery and distribution of classroom questions are important aspects of a teachers' questioning behaviour.

Some of the following hints if followed would be beneficial to the teachers and will assist in making questioning a useful technique of teaching.

- Involve students in discussion without any threat.
- Put the question to the whole class and not to a particular



student by pointing towards the child.

- Wait after questioning and then ask a particular student to answer. Research shows that a 3 seconds (at least) pause should be allowed after a question is asked. This ability to wait while the students consider the question and structure the response:
  - i) gives time to students to view the question from all different angles,
  - ii) presses them to respond by speaking what is on their minds, and
  - iii) suggests that they share the responsibility for their learning.
- Provide variety of questions at different levels to develop different competencies.
- Follow a logical sequence in questioning using lower order questions followed by higher order questions in increasing complexity and competency being assessed.
- Avoid leading questions as they discourage listening habits of students and avoid stimulation of thought.
- Repeat students' response only when immediate reinforcement is needed.
- Prompt students by providing content clues to those who fail to answer.





- Avoid 'Yes' and 'No' questions as they evoke inadequate response and do not provide opportunities to think or to diagnose problem areas of learning.
- Distribute questions evenly to cover the entire class, left and right, front, and back. Questions should not be asked in a regular order round the class, so that the class does not know to whom the next question is coming. This helps to gain students' attention.
- Ask students to repeat the correct answer provided by some other student.
- Whenever required enrich the answer by giving more information.
- Try to relate questions to children's experiences and social environment.
- Keep the questioning moving rapidly and avoid asking the same question to more than two students.
- Encourage students to ask questions on any thing which interests them.
- Let the whole class express an opinion on a particular question that demands flexible and varied answers.
- Provide immediate feedback to the student for reinforcement if the answer is correct.
- While questioning, it is necessary to guard against trivial and



superficial questions which do not reflect thought or those which side-track the lesson into by paths.

Besides knowing how to deliver questions to the students in the class it is also important to know how to manage the responses of the students.

### ***How to Manage Student Responses***

The success of questioning depends upon answers. Questions should be formulated with a view to securing the right answers. The art of dealing with answers is as important as the art of questioning. Needless to say that when students are designated by the teachers to elicit responses to his/her questions, a variety of situations arise and the teacher is supposed to manage those responses in a manner that the intended objective is realised. Three important aspects to be kept in mind by the teacher while dealing with answers are: from whom to seek answers, the form of answers and how to deal with wrong answers. The skilful management of students' responses forms an integral part of the technology of classroom questioning. The attitude of the teacher towards the response of students and handling of the response has much to do with the success of classroom interaction. The types of responses with which a teacher is faced are given along with how to handle the different types of responses.



requiring lower level mental process indicate lack of students' knowledge of subject matter. While wrong response to a higher order question may be due to lack of requisite information or due to his difficulty in processing of the information to arrive at the correct response.

*iii) Incomplete response :*

This situation implies that there is some discrepancy in communicating the intent of the question or it requires long response. Incomplete response or failure to recall all the facts may be due to lack of proper understanding of the question, inability to structure his/her response, interference of teacher or pupil in the class are some of the contributing factors.

A teacher may ask a supplementary question to evoke response to the missed out portion. The completed answer may then be got repeated by the student.

*vi) Partially correct/incorrect response :*

Partially correct or incorrect response situation may occur due to incomplete response situation, inattention of students at the time of classroom questioning or due to guessing of responses. Teacher may ask a probing supplementary question with a view to separating the correct information from the stated response.

*v) Inappropriate language and structure of response :*

The response is worded in inappropriate language even though the



response is correct and complete. It could be due to the response comprising of different statements in a particular sequence but the student may fail to keep up the sequence.

*vi) Correct response :*

This is a situation when the criterion response (acceptable) is the correct response containing essential contents as well as appropriate language, and structure. There can be more than one correct response for some questions especially those of higher level thinking or synthesis. In such cases also, complete correctness of the response is judged in the light of the criterion response expected by the teacher.

***b) Response management behaviour of teachers***

Teachers, therefore, need to deal with student responses in such a manner so as to seek criterion response from the student concerned. The teacher therefore has to lead the students to correct response. This requires use of reinforcement (verbal and non-verbal) to focus on the desirable behaviours and criterion responses of students. These reinforcers help strengthen desirable responses and provide positive feed-back to the student, which enhances positive self-concept and encourages them to participate actively in classroom transactions. Besides knowing how to deal with students, responses teachers must also make effective use of reinforcers to direct students' behaviour.





### *Use of Positive Verbal Reinforcers*

These include praise words such as 'good', 'very good', 'excellent', 'right', 'yes', 'correct', 'fine', 'go ahead', 'continue', etc. Teacher's verbal behaviour such as use of statements accepting student's feelings, repeating and rephrasing student responses, summarizing students ideas, etc are also referred to as positive verbal reinforcers.

### *Use of Positive Non-Verbal Reinforcers*

These include teachers gestures conveying approval of student responses. Teacher behaviour such as smile, nodding of head, clapping, attending to the student by looking at him, listening attentively to what the student has to say are some non-verbal reinforcers.

#### **Example**

- Teacher : What are the causes of soil erosion ?
- Pupil : Cutting of forests.
- Teacher : (Smiles and further enquires) What are the other reasons? (Positive non-verbal reinforcer)
- Pupil : (Silence-)
- Teacher : (Frowns) Try to recall the other factors leading to soil erosion (Negative non-verbal reinforcer)



- Pupil : Grazing of animals destroys the grass which helps to hold the soil together.
- Teacher : Very good. (Positive Verbal reinforcer) The trees, grass etc. hold the soil together and check the flow of water which helps to prevent erosion of soil. (Teacher summarizes pupil's ideas.)

The teacher can use the following management behaviours to manage students' responses, and to seek criterion response from the student. These behaviours comprise of reacting, prompting, seeking additional information, redirecting, refocussing and increasing critical awareness.

i) *Reacting behaviour :*

This refers to accepting, rejecting or no reaction by the teacher. Wrong responses are outrightly rejected or it could be suggestive or corrective rejection. But punitive rejection or strong words are not desirable. Even an ignoring behaviour may imply rejection.

ii) *Prompting :*

It is a hint or cue to lead students to a correct response (criterion) in case of no response or wrong response situation. It does not get correct response but directs students' to think towards the correct response. The teacher has to keep in view the experience of the students, consistency of the response and the criterion response for



selecting specific prompts in a particular situation. Prompting promotes better learning since it elicits the desired response from the student, provides encouraging stimuli as cues and a sense of emotional security, and helps structure response on the basis of the cues thus providing a feeling of accomplishment which enhances students' self-image.

#### Example

- Teacher : What are the likely effects of reduction in annual production of artificial fertilizers?
- Pupil : Farmers are likely to get less fertilizer this year.
- Teacher : Any other effect? (Prompt)
- Pupil : *(No response)*
- Teacher : Will it affect the yield of next years crop? (Prompt)
- Pupil : Yes.
- Teacher : In what way? (Prompt)
- Pupil : Farmers will have to use less quantity of fertilizers for their crops.

A judicious use of prompting in the classroom is therefore, desirable for active participation of students in the teaching-learning activities in the classroom.



iii) *Seeking additional information :*

In case of incomplete or partially correct responses teachers may ask more questions to elicit further information by using words like 'anything else', 'what else', etc.

**Example**

Teacher : In what way are forests are useful to man?

Pupil : For providing us timber.

Teacher : Any other use ? (Seeking additional information)

Pupil : For preserving wild life.

Teacher : Yes, any other use ? (Seeking further information)

Seeking further information consists of eliciting additional information from the student providing the response, to help bring student's initial response to the expected level of the response.

iv) *Redirecting :*

It refers to asking the same question from another student. Sometimes the answers are not which are intended or expected by the teacher. The teacher in this case redirects the question to some other students in the class. This helps in providing a complete or intended response and also provides feedback regarding the missing aspect of the response. This increases students' participation and at the same time breaks the dead-end of a particular student's inability





to answer.

v) *Refocussing* :

Once the correct response is received the teacher helps the student to assimilate and provides further enrichment by demanding responses related to the desired ones based on his past experience or ask for implications in new situations. This helps to strengthen the response given by the student and stimulates his/her thinking.

Example

Teacher : What other purposes do forests serve?

Pupil : For preventing soil erosion.

Teacher : Any other example ? (Refocusing)

Pupil : For conservation of wild life.

Teacher : If forests are cut what are the likely consequences. (Implication for a new situation)

vi) *Increasing critical awareness* :

When a correct response is received the teacher can further enrich the responses by asking for the rationale of the answer or deliberately asking questions to provide deeper insight into the concept. Questions related to 'why' and 'how' of the correct response are asked to increase the critical awareness of the students.

Example

Teacher : For what other purpose forests are useful to men?



Pupil : For creating nature's balance.  
Teacher : How?  
Pupil : Interdependence of plants and animals....

*vii) Restructuring :*

This situation occurs when sometimes students' responses though correct, are expressed in inappropriate language, or responses are not in proper sequence. Teacher helps to re-phrase response and provides correct sequence which is necessary, especially in case of long responses.

**Example**

Teacher : In what ways are forests useful to animals?  
Pupil : They prevent wildlife.  
Teacher : Let us say, 'they conserve wild life'.

To deal with different response situations it is necessary that teachers make use of probing questions and its component behaviours of prompting, seeking additional information, refocussing, redirecting, increasing critical awareness and restructuring of students response for effective teaching learning transaction.

## **To Sum Up**

Questioning is the most potent device for effective teaching. It not only enhances active involvement of students in the teaching learning process but encourages creative thinking among students



also, thereby making them active participants in the learning process. Teachers need to differentiate between questions that perform management functions and the questions that serve the pedagogic functions. Teachers also need to know the characteristics of good questions, how to structure them, when to ask questions, mode and effective delivery of questions, and how efficiently to manage students' responses. Also for effective questioning teachers must be conversant with the purpose of questioning at different stages of the instructional process, should know how to question and avoid unwanted collateral effects. The next section provides exemplars on the different aspects of questioning.



## VII

### EXEMPLARS ON QUESTIONING

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*"To conceive an educative question requires thought;  
To formulate it requires labour;  
To pose it, tact.  
None of this is mysterious  
And all of it is within our reach".*

---

*(Dillon, 1983)*

Questioning as a device of teaching and learning and also as a tool of assessment for teachers, envisages use of quality questions by teachers at different stages of the instructional process. What type of questions should be asked, in what context, and for what purpose, must also be taken cognizance of, while using the questions. As seen earlier, questioning skill demands teachers' understanding and application of the context of questioning including its purpose, rationale, methodology, management and response it may elicit.

It is in this context that resource material in the form of exemplars has been prepared for teachers which are based on a conceptual framework developed for the purpose. The exemplars developed are based on the content of science textbooks of classes VI and VII, especially keeping in view the target group i.e., teachers and





teacher educators at the elementary stage. This particular attempt is confined to the cognitive domain, and the use of questioning for development of different cognitive abilities. However the way a question is framed, to whom it is addressed, wait time for response, etc. indicate expectations of the teacher, which have a strong bearing on the way the subject matter is learnt.

## ASPECTS OF QUESTIONING

In order to develop questioning skill, for bringing fruitful interaction between students and teachers it is necessary that teachers and teacher educators understand and acquire 'skills' in asking and using questions. The development of questioning skills relate to the following aspects :

Context of questioning : Setting in which the question is to be asked.

Purpose of questioning : Intended objective of the question.

Basis of questioning : Nature and type of questions to be asked.

Methodology of questioning : Mode and efficacy of questions.

### ***Context /Stage of Questioning***

Effective questioning demands that teachers must take cognizance of the setting in which question is being asked with respect to the subject area or unit of teaching in which questions will be



used. In this context, setting refers to the location of questions which could be - questions used at the start of the lesson for judging pre-requisites to learning questions used as an integral part of the lesson while transacting the subject matter, questions for assessment of pupils to diagnose difficulties in learning, or questions used for review ~~given~~ of the lesson. Questions can be profitably used at different stages of the lesson e.g., at pre-instructional stage for testing pre-requisite learning, motivating students, or seeking pupils' cooperation. They could be used to develop, clarify, elaborate or reinforce concepts during the instructional phase. Questions could also be used for review, diagnosis, reinforcement, or for judging the outcomes of learning at the post-instructional stage.

The other setting of questioning is the subject area. Exemplar material in each subject can, therefore, be developed on the basis of the whole syllabus, a unit or even on a single lesson. Thus, context of questioning, in terms of content area of teaching and the instructional stage, determine the nature and type of questions to be asked during classroom teaching.

### ***Purpose of Questioning***

The major purpose of questioning is : (i) judging the pre-requisite learning necessary for developing the lesson (ii)enriching the content during developmental teaching (transacting the lesson content)and (iii) assessing outcomes of learning.



Pre-requisite learning can be judged by using questions to test knowledge and skills considered necessary for a particular unit of teaching. In case of developmental teaching, questioning could focus on clarifying reviewing of the concepts and reinforcement of the concepts. Questioning for assessing students may aim at evaluating students' learning, diagnosing weaknesses, and for providing feedback for improvement.

### ***Basis of Questioning***

Questions used in questioning can be grouped broadly into three categories using three different bases of classification i.e., content-based, learning outcomes\*, and pedagogic. The content-based questions are based on different content elements, like the terms, facts, concepts, principles, processes, themes, etc. in case of subjects like science and social sciences. In case of languages, it could be working vocabulary, recognition vocabulary, spellings, syntax or other linguistic elements. Accordingly a question may be used to develop or assess learning of a fact, a concept, and/or a principle, etc. Secondly, questions asked could be based on learning outcomes i.e., knowledge, comprehension or application based. Accordingly, questions could be framed depending upon the ability to be developed

\* This term has been used to categorize questions in terms of expected or intended learning outcomes as implied by the three major instructional objectives of the cognitive domain i.e. Knowledge, Comprehension (understanding) and Application. The focus of these types of questions is on the development or assessment of related abilities specific to each learning outcome (Gronlund, 1985).



or judged by the teacher. Thirdly, questions based on the pedagogic requirement need to be developed with active participation of students in the teaching-learning process. This helps in clarifying students' inquiries, diagnosing weakness, assessing feedback, and remedial teaching.

Pedagogic questions can be classified as managerial, developmental, and evaluative questions. Management questions can further be divided into motivational, attention seeking, procedural, and directional questions. Developmental questions comprise inquiring, involving, clarifying or elaborating types. Similarly, evaluative questions include reviewing the lesson, diagnosing the weaknesses, judging students' progress or reinforcing of concepts. Thus the context, purpose, and basis of questions provide a frame for questioning by the teacher in the class.

### ***Methodology of Questioning***

It is evident that understanding of context, purpose and basis of questioning is a necessary condition for its effectiveness. Besides this, effective questioning demands that the right type of question be used at appropriate time to elicit the relevant response from students. Therefore, mode or methodology of questioning is also an important aspect for effective use of questioning as a teaching device. On the part of teachers, effective methodology of questioning demands, (i) the ability to formulate questions, and (ii) the ability to question skilfully.





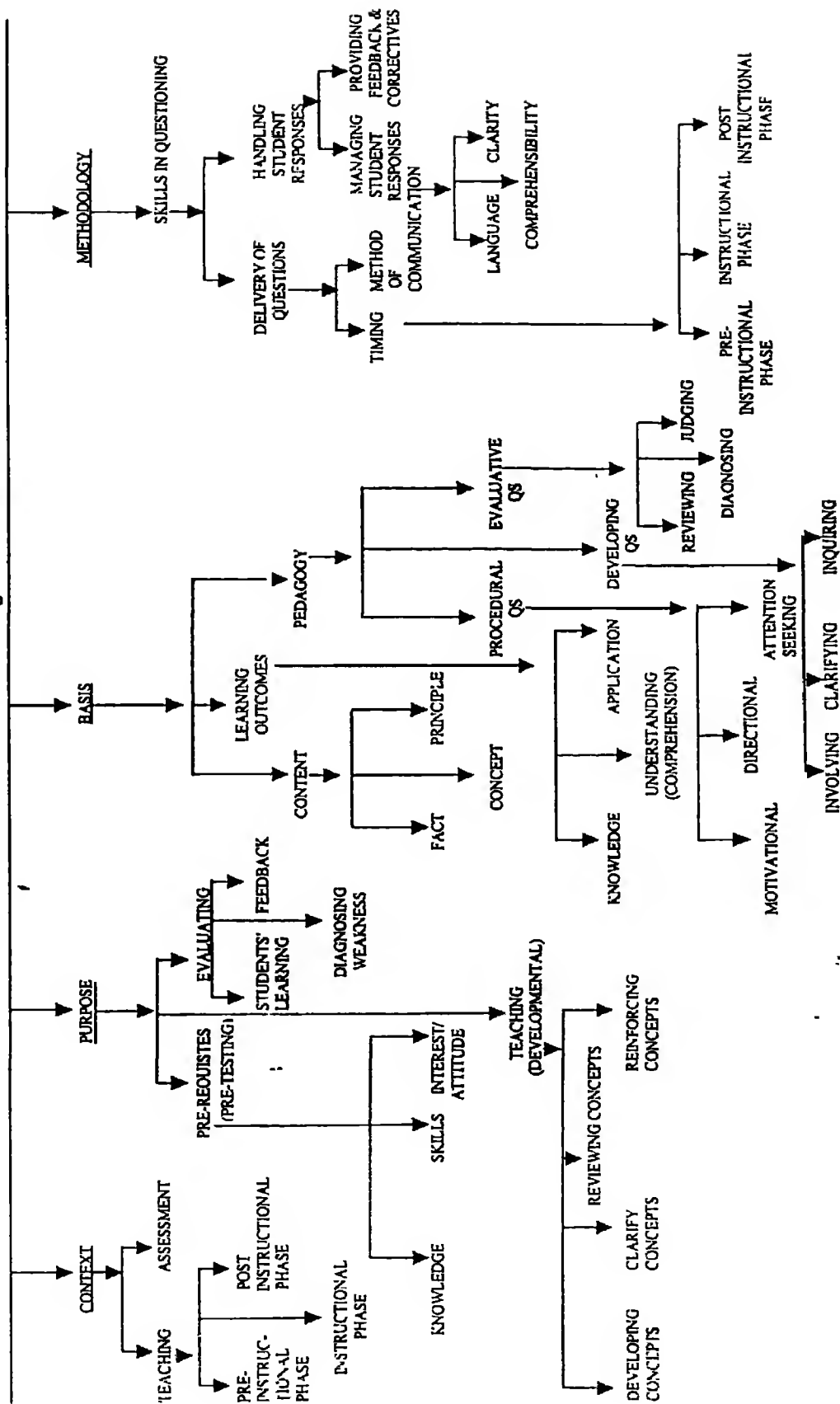
Formulation of questions envisages selection of appropriate format for questions and their quality. Format of questions can be verbal, non-verbal, symbolic or diagrammatic/pictorial depending upon the teaching-learning situation. Verbal questions could be of free response type or fixed response types requiring students to either select the correct response or supply the response in one word or phrase. Symbolic or diagrammatic/Pictorial questions can be used with the help of a black-board. As stated earlier, the wording of questions needs to be precise, unambiguous and clear, to enable students to respond accurately. Relevance, appropriate wording, and clarity in formulation of questions are also essential requirements to communicate the nature and scope of expected response from the students.

Skill in questioning demands effectiveness in delivery and distribution of questions and management of students' responses. Delivery of questions is effective if timing and method of questioning and communication are appropriate. Timing of a question refers to the phases of instruction i.e., the pre-instructional, instructional, and post-instructional. Mode of questioning could be written or oral. Communication of a question demands clarity in the scope of acceptable response, language comprehensibility; and proper wording of the question in a simple and precise language.

The description of the four aspects of questioning provides a



**FIG : 1 CONCEPTUAL MAP OF QUESTIONING**





framework for teachers in the use of questioning in the class. It is depicted in the form of a 'conceptual map' of questioning as given in Fig : 1 which is used as a paradigm for developing exemplar material on questioning.

Based on the suggested framework questions have been developed for use of teachers in questioning during classroom teaching. Context of questioning is indicated in term of unit of teaching or lesson. The questions may focus on any one of the instructional phases i.e., pre-instructional, instructional or post-instructional. The purpose of question is also indicated, as to whether it is for testing pre-requisite learning, development or assessment. Similarly, the basis of each question is also indicated whether the question is content based, learning outcome based or pedagogy based.

In case of learning outcome-based questions, it is considered desirable to indicate the instructional objectives it aims at i.e., knowledge (k), understanding (U) or application (A). This gives an idea on how maximum advantage may be derived of questioning as a teaching device to develop wide and varied competencies among students. Each question may also be classified to reflect its basis, i.e. the content it covers, the intended learning outcomes or the pedagogical emphasis it lays on.

Keeping this framework in view the exemplars are developed and an attempt has been made to categorize them as given below:



- Unit of teaching e.g. Living things/ Solar system.
- Context/stage of teaching e.g., Pre-instructional, instructional, and post-instructional.
- Content elements emphasised - a fact, a concept, a principle etc.
- Learning Outcomes based questions include abilities and skills implied by the three major instructional objectives i.e. Knowledge, Comprehension (Understanding) and Application (infer, interpret judge, etc.)
- Pedagogic basis - Managerial, developmental or evaluative. Its specific purpose e.g. developmental, motivating, involving, inquiring, clarifying, elaborating etc.

It is within this frame-work that various types of questions are developed on some teaching units of Science and Social studies for classes VI and VII.

#### ***A LESSON IN EXAMPLE:***

Unit : - Structure and Function of Living Body

Class :- VII

Phase :- Pre-instructional / instructional

Content elements :- Fact (F), Concept, (C), and Principle (P)

### **PRE-INSTRUCTIONAL STAGE**

At the pre-instructional stage the teacher is supposed to establish linkages with students' pre-requisite learning. This can be done by :





- (a) introducing the unit with a story, experiment, discussion, etc. depending on if it is a new unit, or to be related to previous learning,
- (b) testing knowledge, understanding or skills considered as pre-requisites to learning of facts, concepts, and principles to be taught in a particular unit, or
- (c) directing questions to the students to evoke interest like:
  - Do all plants have supporting roots?
  - Do aquatic plants breathe?

### ***Testing of Pre-requisite Learning***

Some exemplars testing the pre-requisite learning are given below.

- Which animals are called vertebrates ? (fact)
- Give two characteristics of living organisms? (fact)
- Define respiration in plants? (concept)
- Name a single-celled animal (concept)
- On what basis can a duck and a frog be classified together (principle)

## **INSTRUCTIONAL STAGE**

It is the phase of developmental teaching which means that students learn new terms, facts, concepts, principles, processes or themes as the lesson proceeds. It also involves processes like, explaining, elaborating, clarifying or reinforcing of new concepts. Use of effective questioning during instruction helps to create interest and involvement



of the students and provides feedback on students' learning and on effectiveness of teaching. Besides the quality of questions asked' it is important to know their purpose. Exemplars related to three categories of questions, contents, learning outcomes and pedagogy are given.

## ***I. Content Based Exemplars***

Content based questions can be used in questioning during teaching to enable the students to acquire new terms, facts, concepts, principles, processes or generalisations, which are an integral part of the lesson/unit of teaching. When the question is to be stated, in which context and for what purpose, is for the teacher to decide.

### ***a. Terms***

A word or two depicting a number of features of one or more objects or things and subsumes them in one or two technical terms. Terms in the content need to be learnt before the facts, or other content, elements are learnt. This requires familiarity with a large number of words in their common range of meanings. For example 'terms' like parliament, root, triangle and so on. Some examples of terms are given below :

Examples :

- Pea has a *tap root* system. What does it mean ?
- Name any plant having *fibrous roots*?
- What is *photosynthesis*?
- What is a *heribivorous* animal?



**b. Facts**

Facts include very precise and specific information of dates, events, persons, places etc. It may also include approximate or relative information such as an approximate time-period or general order of magnitude of a phenomenon. Some examples of 'facts' are given below:

**Examples :**

- In which plant are roots modified to store food?
- Can green leaves manufacture food in the absence of sun-light?
- Which is the heaviest gas?
- Which animals are called vertebrates?

**c. Concepts**

Concepts are ideas or expressions representing the common element or attribute of a group or class. Concepts subsume a number of facts. These may be in the form of a word like 'universe', or in compound words like 'Living body'.

**Examples**

- You have observed different flowers. Do you think all flowers have the same basic parts- the sepals, petals, stamens, and carpels? (Flower is the concept).
- Which pigment makes the colour of a leaf green? What are the conditions necessary for green leaves to manufacture food for the plant. (Chlorophyll, sunlight, etc. are concepts)



d. *Principles*

Principles include knowledge of particular abstractions which summarize observations of phenomenon. These are abstractions which help in explaining, describing, predicting or in determining the most appropriate and relevant action or direction to be taken (Bloom, 1956). Principles are higher order generalisations which are acquired or understood only when different concepts are joined together to formulate a principle which encompasses those concepts.

Examples :

- One form of energy can be transformed into another. Illustrate.
- In a given environment, living and non-living objects depend on one another in many ways. Enumerate the given statement.
- Conservation of water is conservation of life. Do you agree? why/ why not?

The content elements i.e., terms, fact, concepts, principles, etc. provide the basis for formulating questions at different stages of the lesson. Teachers therefore need to identify these before the start of any lesson.

### ***Roots and Shoot Systems***

Besides explaining or describing different types of roots, stems, leaves and their modifications, teacher can make use of diagrams/ activities for students to explain functions of different parts of a plant and their modifications or adaptations. Based on the content elements (terms, facts, concepts, and principles) questions can be asked, testing





various learning outcomes implied by the three major objectives i.e, knowledge, comprehension (understanding) and application. However, it is neither possible nor desirable to use the questions in a sequential manner, since use of any question depends upon the content taught and the student's response which ultimately decides the course of interaction. The exemplars given will enable teachers to appreciate how different questions relate to different learning outcomes, thus evoking corresponding levels of thought in the student.

**EXEMPLARS :**

*(a) Terms : (Knowledge (K) / comprehension (C) questions)*

- Name the process by which green leaves manufacture food in the presence of sunlight? (Recall) K
- Define respiration in your own words. (Translate) C
- Which of the two petals or sepals attract insects for pollination? (Recognizes) K
- If the tendril arises in the axil of leaf, is it a stem or a leaf? (Identifies). K
- In the given diagram on black board which part would give rise to a fruit? (Observes and relates) C
- In which respects does the process of photosynthesis differ from that of respiration? (Differentiates) C

*(b) Facts : (Knowledge (K) / comprehension (C) questions)*

- Do roots help in absorption of mineral salts from the soil?



(Recall).

- Which of the two, wheat or sweet potato, serves the storage function? (Identifies) K
- Give an example of a fibrous and supporting root (Illustrates) C
- Which part of the plant helps to conduct water and mineral salts to the leaves? (Relates) C
- How do incisors and molars differ in their functions? (Differentiates) C
- Which of the following organs cannot be categorised along with the three others-Veins, arteries, nerves, and capillaries (Classifies) C
- Brain, spinal cord, and veins are the main organs of the nervous system. Is the statement correct? (Detects errors). C
- How do green flat stem and spine in cactus help the plant? (Interprets). C
- On what basis would you say that a piece of ginger is a stem and not a root although it grows underground (Explains) C

*(c) Concepts : (Application (A) questions)*

- The food chewed in the mouth is more easily digested. Why? (Analyses). A
- The leaves in a potted plant start yellowing. What could be the reason? (Hypothesises). A

These questions are not exhaustive but only suggestive of the different abilities which could be developed, based on content aspects during the development of the lesson. As mentioned earlier it is for



the teacher to decide when to use a question, in which context and for what purpose.

## ***II. Exemplars Based on Learning Outcomes***

In contrast to content-based questions on different aspects of testing different abilities, the questions based on learning outcomes focus on testing of maximum possible abilities through one or more content elements. Even using a single concept, these questions can be developed involving different abilities. Examples of knowledge and comprehension based questions have already been given in the previous pages. Therefore, they have purposely been not included under the present category of questions related to learning outcomes. However, examples should vary from recall to interpretation to judgment.

### ***EXEMPLARS***

- All tendrils are stem tendrils. On what assumption this statement could be considered as correct? (Analyses)
- If the food we eat is not digested what could be the possible reason for this? (Hypotsises)
- A plant with green leaves is drying up. What could be the possible reasons? (Hypothesies)
- What procedure would you adopt to separate a mixture of iron filling, camphor, salt, and sand? (Suggests)
- Why do the seeds sown do not germinate, if there is heavy rainfall immediately after sowing? (Gives reasons)



- Why do we slip when we step on a banana skin thrown on the floor? (Gives reasons)
- In some plants stems are modified to form spines, tendrils, tubers or get flattened and succulent. What could be the advantage of such modifications to the plant? (Infers)
- What would happen to a potted plant with green leaves if it is kept in the dark for a few days? (Predicts)
- A few seeds are sown in a potted plant under proper conditions of air, moisture and temperature; If the plant is kept in a dark room instead of a well lighted room? what will be the effect on germination? (Predicts)
- Keeping in view the functions of veins, arteries, and capillaries examine and reword the statement given below : Impure blood is carried by arteries to the heart while the veins carry pure blood from heart to the body (Judges).

These questions aim to develop in students the ability to apply knowledge, and understanding of concepts taught in the class and should involve, new, or unfamiliar situations.

### ***III. Pedagogy Based Exemplars***

Pedagogy based questions focus neither on testing of content elements nor on assessment of competencies (i.e., examples given under content-based and competency-based questions in previous pages). Focus of pedagogy-based questions is on making teaching - learning process more effective by making students more motivated,





interested, participative, and to make teaching student-oriented. These questions also obtain feed back on students' learning and their weaknesses, thereby help teachers in reflecting on the impact of teaching. The pedagogy-based questions are categorised into three major categories; the procedural/managerial, the developmental and the evaluative questions. Each of these are further divided into sub-categories. The following questions are few illustrations of the different categories and sub-categories.

### ***A. Managerial Questions***

These questions are used to motivate the students and prepare them to become interested in the lesson. Some of these questions can also be used for seeking attention, or giving directions to the students. These questions also help to work out procedures/strategies to facilitate teaching and learning.

#### *Motivational Questions*

Unit: Lesson 'Living World'

Man, animals, and plants are closely inter linked and are interdependent in day-to-day life. Hence the need to study the living world and appreciate the need for maintaining balance in nature, should be highlighted. To cultivate interest and to motivate pupils as to the importance of the topic, questions like the following may be asked.



## EXEMPLARS

- Do you know that plants, like animals and human beings, are also living organisms that respire, grow, reproduce, and show irritability?
- Are you aware that over 1,600,000 species of animals and over 400,000 species of plants are there in the world today?
- Do you know that neither man nor any other animal can prepare their food. We all depend on ready made food manufactured by plants. This shows how dependent we are on plants?
- Can you imagine that because of man's indiscriminate destruction of plants through deforestation and other activities about one fifth of plant species would become extinct by the turn of this century?
- Can you give an example showing ways in which animals and plants are interdependent?
- Why there are restrictions imposed on killing certain animals? Which are these animals?

### *Attention seeking Questions*

Context/Stage : Classroom teaching - instructional phase

While teaching it sometimes becomes necessary to seek student's attention when they become inattentive. This could be when the teacher is going to review a lesson or recapitulate for students; attention is to be drawn to the main or focal points, or a new activity is undertaken or some work is assigned to the students either individually or in groups, or it could be when the teacher wants to



draw attention of the class to some good work or answer written by a student. Therefore, depending upon the situation and purpose, questions like the following can be used.

#### EXEMPLARS

- May I have your attention please?
- Are you ready for today's lesson?
- Am I audible to all of you?
- Is the blackboard readable to students at the back?
- Would you repeat the answer given by Sushil in response to my question?
- May we quickly review what we discussed yesterday?

#### *Directional Questions*

Context : Classroom Teaching-Students' involvement

These questions provide direction to students to do something in a desirable manner or according to intended procedure. It may include request to undertake an activity, an assignment, a project, etc. These directions usually pertain to the various stages of a lesson depending upon the need and situation. To enrich the teaching learning process the following types of questions can be employed for the purpose.

#### EXEMPLARS

- Please open your book on page 47.
- Pankaj, please read aloud the passage again.



- Ramesh would you locate Chandigarh on the given map of India?
- Draw a neat labelled diagram of the circulatory system of man.
- Uproot a small plant and cut its roots and fix up in the soil.  
Observe whether the plant grows or dries up?

### *Procedural Questions*

#### **Context-Classroom teaching - Pupils' involvement in decision making**

These questions differ from directional questions. Their focus may be on developing, adopting, approving or suggesting a procedure to do a task, to undertake an activity or plan a small project. It may focus on an individual or a group of students who are supposed to work out, approve, adopt, accept or reject a procedure. These questions engage students in an intellectual or practical activity in accordance with the desired procedure, so that they get the needed insight and experience in different modes of learning. Following questions are some examples which can be used as procedural questions:

#### **EXEMPLARS**

- In what way would you like to group yourselves for the project that has been planned?
- How much time would be approximately needed to finish the task?
- In what ways can we do this task more effectively?
- Have you collected enough material to draw conclusions?
- Is there any need for rearranging the desks to conduct the quiz competition?





- Who will volunteer to summarise the main decisions taken in the group discussion?
- Is there any one who does not agree with the suggested method to carry out the project? If so, give an alternative.

## ***B. Developmental Questions***

These questions are mainly used during the instructional phase for teaching. Such questions are meant for developing, clarifying, elaborating or reinforcing concepts being taught. Inquiring, involving and encouraging student participation becomes a necessary ingredient in this instructional intervention. Accordingly, these questions can be classified as involving, inquiring, clarifying, and reinforcing questions.

### ***Involvemental Questions***

These questions require evoking of such mental responses, which make students think and reflect, thereby demanding exercise of higher order thinking on the part of students. The more the question triggers the higher order mental processes, the more the involvement of the students will be ensured. The idea is to make learning activity-based, personalised, and student oriented. Following are some exemplars of such questions :

Context : 'Structure and Functions of plant'. Questions given below are listed with the intention that they make students think and involve in exercising the higher order mental processes in order to respond



to teacher's questions.

### EXEMPLARS

- Why does sweet potato and beet have swollen roots? Do we eat such roots ? (Suggests answer)
- Name some roots that we eat?
- Did you observe root like structures hanging from a banayan tree? Are these roots or stems? (Give reason)
- What purpose do these roots serve when they reach the ground?
- Can you give any other example of supporting roots?
- Ginger grows inside the soil but it is regarded as stem. Why?

### *Inquiring Questions*

These questions may relate to students previous learning, their own experiences, problems, mode of learning, their queries, or invite students to know about their progress, understanding, and self reflection. These questions help the teacher in deciding future course of action by judging the adequacy of their students' learning or achievement. In accordance with their basic information, preferences, interest, and learning needs, new concepts could be introduced. It is felt that there could be no single pattern of inquiring questions, and may vary with the lesson and context of teaching. However, exemplars given below indicate the nature and scope of such questions that can be used under this category.

Unit : Structure and function relating to different systems in human



body : like the digestive and circulatory systems.

#### EXEMPLARS

- How is food digested in our body?
- Why, in your opinion, is mouth the first organ concerned with digestion of food?
- Are teeth in your mouth alike in shape and size?
- Do different types of teeth serve different purposes?
- Which of the two types of teeth, the canines or molars, could be more useful to flesh eating animals like tiger?

#### *Clarifying Questions*

Questions can also be used to elaborate or clarify a concept by involving students in a dialogue. There could be one, two, or a series of questions in a row, and instead of repeating the same description or explanation students are involved in a well conducted dialogue to answer their questions.

Unit : Root and shoot system. Certain concepts like fibrous root, tap root, arial and underground stem, leaf and modifications of root, stem, and leaf have already been taught in the class. Further clarification of these is shown through active participation of the students engaged in a dialogue with the teacher.

#### EXEMPLARS

Teacher : Does a root grow inside the soil?

Student : Yes, it does grow inside the soil.



- Teacher : Can we, therefore, call ginger a root?
- Student : Yes, we should.
- Teacher : But do you know in reality ginger is an underground stem.
- Student : How can that be ? It is found inside the soil, like a root?
- Teacher : All right , how would describe a stem?
- Student : Every stem has nodes and internodes, where do we find these structures in ginger?
- Teacher : Observe carefully (a piece of ginger is given to the students). As you see there are a number of lines all round at small distance, these are the nodes and the distance between any two lines represents the internode.
- Student : But where are the leaves we find on the stem?
- Teacher : Observe again each node or the line and you will find small scale leaves-these are not the green leaves. Are these features not that of a stem?
- Student : Yes, that means ginger has a swollen stem like that of a sweet potato which is a root as we have learnt earlier.
- Teacher : In sweet potato roots are modified to store





food and therefore get swollen. Likewise it is the underground stem in ginger that gets swollen because of storage of food.

Student : Is this the same as in corm which has underground stem which serves the same function of storing food?

Teacher : Yes, you are right. Could you think of any other underground stems which serves the same function of storing food?

### ***C. Evaluative Questions***

These questions can be used by the teacher at pre-instructional, instructional, and post instructional phases of teaching. At pre-instructional stage these questions relate to testing of pre-requisites; during instructional phase they are used for reviewing a sub-unit, diagnosing difficulties, or judging students' learning to get feed back. The focus is to take a review of what is taught and to find out the progress, identify hard spots of learning and to make judgements of students' learning.

#### ***Review Questions***

After teaching a lesson it is necessary that a quick review is made by means of sequentially arranged questions. The idea is to recapitulate for the students the main points and clarify certain concepts which have not been properly understood.



## Unit : 'Our Solar System'

Since the purpose is to review the lesson, it is assumed that it has been taught. For reviewing, the teacher can take the help of questions like the following :

### EXEMPLARS

- Name different planets in our solar system.
- Do planets have their own light? If not; where do they get the light from?
- What are asteroids? Where are they situated?
- Which planet takes the maximum time to revolve round the sun?
- What is the period of rotation of a planet? Which planet has the minimum time of rotation?
- How big is the planet Jupiter as compared to our planet Earth?
- What is the difference between an artificial and a natural satellite?
- Name earth's satellite?
- Name an artificial satellite? For what purposes are artificial satellites used?

### *Judgemental Questions*

These questions are normally used after teaching a unit to judge the achievement level of the students. This is usually done through a written test but can also be done through oral testing using oral questions. These may be directed at students in increasing order of complexity to find out how far the various competencies are developed and those which are not adequately developed. The judgement



questions serve both the purpose of knowing the students' level of achievement and pinpoint the special areas of concern thereby providing the basis for undertaking corrective measures. These questions may be distributed among different levels of students in terms of difficulty level of questions. This can be ensured if the questions are formulated in hierarchical order of competencies ranging from knowledge, understanding and application.

Unit : Unit of teaching "Balance in Nature".

An attempt is made to give exemplars of all the three varieties covering a number of abilities implied under the three major objectives (knowledge, comprehension, and application). The competency intended to be tested for each question is given in the bracket.

#### EXEMPLARS

- Name two animal and two plant products useful to man. (Recalls)
- Which of the three animals is herbivorous, carnivorous and omnivorous? (Man, cow, and vulture) (Identifies)
- What constitutes air and noise pollution? (Differentiates)
- Give an example of a food chain? (Illustrates)
- How is food stored in plants? (Relates)
- How does transfer of energy from one living organism to another take the place in a food chain? (Interprets)
- Do the insect, snake, frog, and peacock form a food chain? If so, in what way? (Identifies relationship)
- Develop a four-organism food chain starting with grass. What



is the basis of such a food chain? (Analyses)

- Mention two human activities that disturb balance in nature and how? (suggests)

### *Diagnostic Questions*

Though every question that a teacher asks in the classroom helps in diagnosing students' strengths and weakness, sometimes certain difficult content areas can be thoroughly diagnosed by means of questions. Such areas or hard spots of learning questions focus only the specific, identified content areas. These questions are usually set at low level i.e., mainly, the knowledge based questions to discover the basic concepts which have not been mastered by the students.

Unit : Modification of root, stem and leaf.

It is visualized that due to confusion of storage roots with underground stems, and stem tendrils with leaf tendrils problems might be faced by students. In this context, the following questions are developed to serve the diagnostic purpose.

### EXEMPLARS

- What is a tap root? How does it differ from a fibrous root?
- Give two major functions of roots?
- Give one example of a root that serves the function of storing food?
- What are rope like structures hanging from the bigger branches of a banyan tree? When these reach the soil what additional purpose do these structures serve?





- Mention two major characteristics of a stem.
- How will you prove that stem conducts water from root to the leaves?
- Is ginger a stem or a root?

### *Reinforcing Questions*

These questions are normally used at the post-instructional stage when certain concepts (though understood by students) need to be reinforced for thorough learning. Such questions help to reinforce what is learnt and also promote transfer of learning. These questions help provide students the opportunity to use and apply the concepts already learnt in different, varied, and new situations, which are not a part of the text. Keeping this in view questions relating to acquisition, review, and transfer of knowledge form the basis for developing of questions for this purpose.

Unit : “Structure and function of living body”.

Questions like the following may be considered for reinforcement of certain concepts.

### **EXEMPLARS**

- Draw a diagram of a typical plant and label its parts?
- Name and draw two plants having tap roots and two having fibrous roots?
- Which of the following are stems and which are the roots? Give reason in support of your answer?



- (a) Ginger (b) Sweet potato (c) Corn (d) Carrot (e) Potato
- Draw a diagram of cactus plant showing nodes and internodes roots and leaves label the various parts?
  - What are the modifications in cactus plant which help it to survive in desert conditions?

## **To Conclude**

Three types of questions have been discussed under three categories, namely; content-based, learning outcomes-based, and pedagogy-based. Exemplars are given under various sub-categories, usable by teachers in the classroom. The basic premise of all types of questions is that during questioning, well worded, properly structured, and sequenced questions need to be used at the right time, with full cognizance of purpose, involving maximum number of students, ensuring their active participation, and getting continuous feedback for improving students' learning.

The underlying idea of each type of question is to improve student's learning and achievement. In the first category of content based questions the emphasis is that teachers appreciate the importance of various content elements e.g., terms, facts, concepts, principles etc. Similarly, in case of exemplars based on learning outcomes, the idea is to enable teachers to appreciate that questioning should not be limited to lower abilities while teaching or assessing students' learning . Research has also shown that, higher



the mental processes evoked by questions asked by the teacher, higher is the level of students' response.

Questions used for motivational purpose lead to development of interest in the lesson, which leads to more concentration. Questions focussed on seeking attention, make the students attentive and questions asked for providing direction help to accomplish a task or activity more accurately and systematically.

Questions used for involvement of students in learning, lead to active participation. Inquiring questions make students more inquisitive and prompt them to raise further questions, thereby making them information seekers. Clarifying or elaborating questions help students to learn more about the concept and also help to get their ideas confirmed (through questions and counter questioning). Evaluative and judgemental questions aid in recapitulation of main points in the lesson, and help students receive feedback, to know the gaps in their learning. This, in turn, helps the teacher to take necessary measures to improve students' learning. It is evident that each variety of question has a specific purpose to serve. However all types of questions focus on making learning more interesting, active, participatory, and student-oriented.



## **LESSON PLANNING - PATHWAYS TO QUESTIONING**

There is enough evidence to show that decisions about the use of questions for any given purpose during classroom interaction is almost solely the prerogative of the teacher. Therefore, the responsibility for determining the most effective means of using questions also lie with the teacher. This raises the issue of how teachers can make appropriate decisions about the purpose, nature, and use of classroom questions.

Lesson planning is considered a necessary step towards making these decisions. Key questions should therefore be central to any lesson plan. Planning and developing a potential sequence of key questions and activities that require students to focus their thinking in a specific direction establishes a framework for the kinds of questions and verbal behaviour the teacher will perform during the actual transaction of the lesson (Tinsley, 1973). It is also suggested that a sequence of questions planned towards a specific objective, establishes the level of thought to be reached by the student. This encourages students to pose questions of their own which helps to increase learning (Hunkins, 1972).

As discussed in the preceding sections, the nature and type of question the teacher employs, constitutes an important factor in sustaining the students interest and to keep them working and thinking at a high level. It is also suggested that use of skilful questioning can help the teacher diagnose the class at two levels. At the logical level the concern is with judging the correctness of the





student's reasoning or information whereas at the psychological level the teacher recognises signs of fatigue, and the need for change of activity or pace of the lesson (i.e., the psychological state of the class and of individual students) (Peters, 1976). Therefore to maintain class response and participation, variation of both level of difficulty, and type of question is of importance.

Keeping in view the above Table :1 shows different stages of lesson, corresponding learning phases, purpose of instruction, and the type of questions which be can be used by the teacher. An attempt has also been made to develop a lesson plan, highlighting the types of questions which can be used at different stages of instruction.

**Table No : 1 LESSON PLANNING : NATURE AND SCOPE**

Stages of Instruction	Corresponding learning phase	Purpose of Instruction	Category of Question
<b>Stage I :</b>			
<b>Pre-Instructional Stage</b>	Motivation Attention seeking, Directional, Pre-requisite	<ul style="list-style-type: none"> <li>• arousing interest,</li> <li>• conducive atmosphere</li> <li>• inducing a mental 'set',</li> <li>• stating objectives,</li> <li>• developing interest</li> </ul>	involving inquiring judging thought provoking pre-requisite learning
<b>Stage II :</b>			
<b>Instructional Stage</b>	Developing, Clarifying, Elaborating, Reinforcing	<ul style="list-style-type: none"> <li>• introducing material to be learnt,</li> <li>• exposition and explanation by teacher,</li> <li>• focus attention to significant features,</li> <li>• structure material</li> <li>• recapitulation,</li> <li>• discussion</li> </ul>	motivational attention seeking directional involving inquiring clarifying elaborating Procedural Developing
<b>Stage III:</b>			
<b>Post-Instructional Stage</b>	Reviewing, Assessing, Diagnosing feedback	<ul style="list-style-type: none"> <li>• providing opportunities for testing</li> <li>• providing a variety of contexts for transfer of learning</li> <li>• diagnosing difficulties for remediation</li> <li>• evaluation of pupils' learning</li> <li>• summing up</li> </ul>	judging reviewing diagnosing Assessing



## EXEMPLAR-LESSON PLAN

Subject : Science

Unit : Health and Diseases

### Overview of the Unit

Students have already studied in the previous unit about food its proximal constituents and significance of balanced diet. Related to the previous one this lesson is on good health and deals with how to maintain it. It also cover aspects like how health is affected by malnutrition, unbalanced diet, and diseases caused through infection. Medicines are used for treatment and to prevent diseases. Besides right food, the need for clean and hygienic environment is also emphasized. Good health needs right type and amount of food in the form of carbohydrates, proteins, fats, vitamins, and mineral salts. Also right preparation of food and measures need to be used to prevent it from getting the food to be spoiled.

### I. Pre-Instructional Stage

<i>Content/Context of Teaching (Introduction) to</i>	<i>Methodology of Teaching</i>	<i>Purpose</i>
<b>Lesson-1</b>		
1. Stimulating the students interest in healthy and hygienic living	<ul style="list-style-type: none"><li>• Teacher can relate present lesson to the previous lesson on food explaining how people suffer from various diseases caused by poor, unbalanced diet, and infection from various sources</li><li>• To make students appreciate the need and significance of personal and environmental cleanliness the class is involved in an open discussion</li></ul>	<ul style="list-style-type: none"><li>• Motivating Pupils</li><li>• Arousing interest of the class</li></ul>
2. Concept of nutrition and unbalanced diet, and its effect on health	<ul style="list-style-type: none"><li>• Relating present lesson to previous one the teacher can emphasize the need for good balanced diet free from, germs and</li></ul>	<ul style="list-style-type: none"><li>• Relating to previous knowledge/learning.</li></ul>



<ul style="list-style-type: none"> <li>- Causes of different diseases</li> <li>- Need for environmental cleanliness</li> </ul>	<p>infection, with the help of questions <i>Like the following</i></p> <p>(i) What do you understand by malnutrition ?</p> <p>(ii) What is a good diet ?</p> <p>(iii) In what way does balanced diet help in keeping good health ?</p> <p>(iv) How is environmental cleanliness essential for healthy living ?</p> <p>(v) What are the possible causes of ill health ?</p>	<ul style="list-style-type: none"> <li>• Knowing the level/ readiness of the class to take up new lesson.</li> </ul>
<p>3. Students are asked to come prepared with a list of problems related to food and health which need attention to minimise the incidence of diseases in India.</p>	<ul style="list-style-type: none"> <li>• Students are involved in an open discussion and the need to produce more food, develop good health habits. Keeping environment clean should be emphasized and intensity of the problem of malnutrition, pollution of air, water and natural environment may be highlighted to make students concerned.</li> </ul>	<ul style="list-style-type: none"> <li>• Involving</li> </ul>
<p>4. Effect of population rise on incidence of diseases and the need for more production as in Green revolution etc</p>	<ul style="list-style-type: none"> <li>• Explain the impact of population increase on health and sanitation of people and how project like green revolution help to control incidence of diseases and other health related problems. This may be highlighted by using questions like the following.</li> </ul> <p>(i) What is the population of India?</p> <p>(ii) How does rise in population lead to more and more problems related to health and incidence of diseases ?</p> <p>(iii) In what way does Green Revolution or White revolution help to reduce or prevent diseases to a large extent?</p> <p>(iv) If population increase continues at the present rate what would be its impact on health and living ?</p>	<ul style="list-style-type: none"> <li>• Connecting problems with existing realities.</li> </ul>
<p>5. Acquaintance with the objectives of the lesson in terms of learning outcomes related to different aspects of health and diseases.</p>	<ul style="list-style-type: none"> <li>• Students can be made to focus their attention on what the students would be able to do through this unit:</li> </ul> <p>(i) know the function of various constituents of food for healthy living</p> <p>(ii) relate various diseases to the deficiency of certain foods.</p> <p>(iii) classify various food particles in terms of sources of various vitamins.</p> <p>(iv) explain how lack of some vitamins/minerals lead to deficiency diseases.</p> <p>(v) give reason for the spoilage of foods</p> <p>(vi) suggest preventive and curative measures for certain diseases related to use of various foods.</p>	<ul style="list-style-type: none"> <li>• Arousing interest by focussing attention on learning outcomes.</li> <li>• Goal setting for mental set or readiness for learning</li> <li>• Link health, disease and hygiene. (Establishing relationships)</li> </ul>



- (vii) (demonstrate) presence of bacteria in the environment
- (viii) predict the effect of poor sanitation, contamination of water and other environmental pollutants in spreading of diseases.
- (ix) prepare charts of vitamins and minerals showing sources and the disease caused by lack of vitamins and minerals.

6. Benefit of study of this lesson, to students in terms of healthy living

- Teacher can ask students to prepare diet charts for one week
- Highlights the significance of the lesson by relating to practise of regulating one's diet for healthy living.

• Developing interest in the lesson and linking with everyday living

7. Knowing if the relevant concepts and knowledge necessary for understanding the present lesson are acquired, which shows students readiness in learning.

- This can be judged by asking questions like the following .
- (i) What are the five components of food ?
- (ii) Which food component is the main source of energy in our food?
- (iii) Give two functions of proteins.
- (iv) Which food component helps in the formation of blood, bones and teeth?
- (v) Why is fat called the energy bank of living organisms?
- (vi) What are the three important qualities of a balanced diet?

• Testing of prerequisites to learning

If inadequacy in pre-requisite learning then remedial teaching is required before moving on to the developmental teaching or instructional, stage of the lesson.

## II. Instructional Stage

1. Knowledge of deficiency of carbohydrates and its effect on health

\* Carbohydrates as main source of Calories

• Teacher illustrates the role of cereals like wheat, rice, maize etc. basic source of calories and can ask question like the following:

- (i) How many calories does a 12 year old require daily?
- (ii) What is the main source of these calories ?
- (iii) How much cereal should you eat per day for these calories ?
- (iv) Could you name some cereals in Hindi?

• Factual Question

• Conceptual Question

• Factual Question

• Conceptual Question

2. Role of proteins and fats  
Proteins help in

b) On the basis of your previous knowledge about proteins prepare a table of food items you use at home which serve as sources of proteins. Questions like the following can be used to develop the lesson

• Structuring the material through activities to be undertaken by children.





digestion, building body parts, repair, replace worn out or dead tissues and cells. Fats are energy banks for storing energy calories which are not used

- (i) Name some food items which have a lot of protein?
- (ii) If there is deficiency of protein what would be the effect on your health?
- (iii) Which of the two, protein or fat, act as energy bank and why?
- (iv) What is malnutrition?
- (v) What would be the effect on one's health who takes too much fat and very little proteins?

- Content 'based questions relating to knowledge, understanding and application
- Recapitulation of previous learning

3 Vitamin and effect of vitamin deficiency on health

- Teacher can review previous knowledge about vitamins with the help of following questions:
- (i) Can we call Vitamins as helping material?
- (ii) Why do we sometimes call Vitamins co-enzymes?
- (iii) Are vitamins made in our body?
- (iv) If one is suffering from scurvy which vitamin deficiency does it show?

- Reviewing
- Diagnosing

4. Vitamins are called essential nutrients and Co-enzymes. There are different categories of vitamins such as vitamin - A, B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub>, C, D and K

- Relating with the previous unit on food the teacher can explain as to why vitamins are also called essential nutrients and co-enzymes and highlights their importance for healthy living. The sources of various types of vitamins, their importance in healthful living and related deficiency diseases can be shown with the help of a chart.

5 Vitamin deficiency diseases are caused due to lack of different vitamins

- Question like the following can be raised during discussion of vitamin deficiency diseases?
- (i) Is night blindness vitamin-A deficiency disease?
- (ii) Can you give another example of vitamin-A deficiency disease?
- (iii) Lack of vitamin-B may result in disease called ...?
- (iv) Which vitamin can help in blood clotting?
- (v) Which of these vitamins, B<sub>1</sub>, B<sub>2</sub>, B<sub>12</sub> is useful in case of anaemia?
- (vi) If fresh fruit like lemon, lime, oranges and guava are taken regularly which deficiency disease will be prevented?

- Connecting
- Explaining
- concept building
- Clarifying
- All these questions will relate to the three objectives.

- Knowledge
- Comprehension
- Application

6 All vitamins are available in different vegetables and fruits. Need

- With the help of a chart of vegetables and fruits the teacher can put questions of various vegetables and fruit asking them to give the corresponding vitamins or the related deficiency diseases.
- (i) Are you ready to answer my questions?

- Involving



for different combination of vegetables and fruits in a balanced meal to avoid vitamin deficiency diseases

(ii) Row -1 make a list of vegetables and fruits which contain Vitamin A and the corresponding deficiency diseases

Row-2 make a list of fruits and vegetables which have a lot of vitamin C and the corresponding deficiency diseases.

Row-3 List the vegetables and fruits which make vitamin-K and the related vitamin deficiency diseases.

(iii) Teacher to judge performances of each group and provide feed back and correctives, if needed

(iv) Students may be asked to collect different charts of vegetables and fruits from the market and develop their own charts depicting vitamins fruits and vegetables and deficiency diseases.

• Unifying the class

• Providing feedback to enhance learning

• Providing direction

7. Recapitulation of what is taught or learnt in the lesson

a) Right type of food for good health.

b) Deficiency of carbohydrates fats and proteins

c) Vitamin deficiency

• Teacher can use the following types of questions to recapitulate what is taught in terms of new terms, facts and concepts and assess whether the corresponding learning objectives as stated at introductory phase, are being achieved.

(i) Define malnutrition in your own words.

(ii) What constitutes a balanced diet?

(iii) The more carbohydrates you take the better it is for your health. Do you agree? If not, why?

(iv) What is the calorie requirement of a 12 year old boy?

(v) Could you tell three different sources of carbohydrates?

(vi) Which of the two carbohydrates or protein helps in building worn out body cells?

(vii) Name four food items rich in proteins.

(viii) Why is fat called the energy bank of our body.

(ix) Why are vitamins are also called essential elements?

(x) A child suffers from rickets. Which type of vegetable will be of help?

(xi) If fresh fruits like lime, lemon, and oranges are taken regularly what deficiency diseases are you not likely to suffer from?

(xii) What type of food would you recommend to a child who shows retarded growth and bad skin?

• Term

• Concept

• Principal

• Recall

• Identifies

• Differentiates

• Cites example

• Interprets

• Translates

• Analyses

• Predicts

• Suggests

Such questions would also help to diagnose difficulties if any and thus help in remediation.



## Lesson-2

1 Importance of minerals  
Minerals are inorganic compounds mostly found in soil, or earth

• An idea about the concept of minerals and various types of minerals their functions and mineral deficiency related diseases can be given by the teacher and the active participation and involvement of the students can be sought by using questions like the following :

- (i) Have you ever taken your meal which is salt free?
- (ii) How indispensable is common salt for our food? Is't it?
- (iii) Do you know where salt comes from?
- (iv) Have you seen rock salt?
- (v) Do you know that rock salt is found in mines?
- (vi) Can you name any such mine?

• Motivating  
and Involving

2. Commonly used minerals are calcium, phosphorus, magnesium, sulphur, copper, cobalt, zinc, iodine, chlorine, potassium and sodium. Essential nutrients needed in a well balanced diet.

• Teacher then provides information that salt is sodium chloride and sodium is one mineral. There are other minerals like iron, sulphur, iodine zinc, copper, phosphorus etc which are equally important for our health and helpful in preventing diseases. With the help of questions like the following the teacher can involve pupils in discussion on the various minerals, their important sources and deficiency diseases

- (i) Read yourself and after sometime asks questions like: try to understand the table on minerals
- (ii) Are you listening to me about the proposal?
- (iii) Can we make groups to share the work?
- (iv) Have we all agreed to work like this?
- (v) Select your own partner to work and share what you have learnt?

• Self-learning

• Attention seeking

• Establishes  
procedure.

• Engaging students in  
taking decisions

Each group would discuss among its members the role of 3-4 minerals, its sources and related deficiency diseases.

3. Various types of minerals their functions, sources and effect on health if deficient in our food

• Teacher can put questions like the following to see if students have understood the role of minerals?

- (i) Deficiency of which mineral causes anemia? Why?
- (ii) Phosphorus is the energy currency of our cells?
- (iii) Dehydration is caused due to lack of \_\_\_\_\_.
- (iv) Magnesium is found in cereals and \_\_\_\_\_

• Relates

• Cause-effect  
of our cells?

• Recall

• Identifies/Relates



- (v) Which of the two deficiency disease, anemia or Goitre is caused due to deficiency of iodine? • Identifies/Relates
- (vi) Which mineral would be useful to prevent excessive bleeding? • Establishes cause-effect relationship
- (vi) To strengthen muscles and nerves one should take green leaves and cereals regularly. Why? • Explains
- (vii) Which 3 minerals are concerned with deficiency diseases of dehydration and extreme weakness? • Cites examples
- (viii) What would happen if one's diet is lacking in milk, cereals and pulses? • Predicts

Teacher may provide on the spot guidance for further improvement.

#### 4. Preparation of food Bacteria spoil food

- Teacher explains how bacteria spoil food and what preventive measures are available. Students' involvement can be sought by posing question like the following.
- (i) Does cooking make the food more digestible? • Involving
- (ii) Give 5 dishes prepared from rice?
- (iii) Why does a slice of bread get spoiled if kept for a day or two?
- (iv) Food kept in refrigerator is not spoiled. Why?
- (v) How can milk be prevented from getting spoiled?
- (vi) How can we keep fish fresh for months?
- (vii) Why can some dried food items be easily preserved?
- (viii) Suggest some other method of preserving fruits and vegetables?

#### 5. Contamination of water

- Students can be asked to prepare a list of uncooked items of food and mode of their preservation from spoiling or contamination. Questions like the following can be asked :
- (i) Develop a list of various methods of storing and preserving mango, milk, fish, potato, banana. • Establishing procedure
- (ii) What are the sources of contamination of water? • Involving
- (iii) How can harmful bacteria be removed?
- (iv) What are ways to remove suspended particles from water?
- (v) How can dissolved impurities be removed?

#### 6. Bacteria in the environment

- (i) In what way flies are responsible for causing diseases?
- (ii) How is the mosquito responsible for spreading malaria?





- (iii) How are insecticides useful to stop malaria?
- (iv) Suggest ways in which community health can be improved?
- (v) What should be done to improve personal cleanliness?

### III. Post Instructional Stage

This stage refers to those activities which follow after the completion of the developmental phase. It includes activities such as summing up of what is taught, a quick review of what is taught, diagnose difficulties, evaluate students learning provide feed back to students. Here again the advantage can be taken of questions like the following :

1. Review of what is taught
  - (i) Food constituents of balanced diets

• Teacher can ask questions like:

- (i) Be ready I am going to ask you a few questions?
- (ii) Who would explain why is right-type of food needed for good health?
- (iii) How are population and health related?
- (iv) How many calories do you require daily (12 yr) and how much cereals should you eat per day for that?
- (v) When does weakness in the body and loss of stamina occur?
- (vi) Give two major functions of proteins in our diet ?
- (vii) Why are fats called energy bank of our body?
- (viii) Why are vitamins also termed as essential nutrients?

- Involving/attention seeking
- Inviting

- (ii) Vitamin Deficiency diseases

• Teacher can use black board and students can be made to respond to questions like the following. These may be written on the black board.

- (i) Deficiency of which vitamin causes night-blindness?
- (ii) Which vegetable, fruits and other food items would you recommend?

- Diagnosing
- Clarifying
- Elaborating
- Feedback
- Correctives

Black Board		
Deficiency referred to by teacher	Lack of corresponding Vitamin in food	Suggested food items in diet
I Night blindness	Vitamin A	Spinach, carrots, Sweet potato etc

- (iii) Mineral deficiency diseases

• In a similar manner the teacher can ask questions on minerals like the following :

- (i) Which is the deficiency disease corresponding to mineral -Calcium
- (ii) Lack of which mineral in diet leads to anemia?
- (iii) What food items would you recommend to a child suffering from



through questioning. This could be better exemplified by a combination of two or three lessons. *This view of a lesson plan is to help teachers realize the importance of asking questions at different levels and stages of instruction for making the lesson more interesting, participative and involving.* Questions and questioning have to go along with the use of other activities, techniques, and strategies which can be used by the teachers while dealing with the lesson.



bad teeth and bones?

**2 Preparation  
of food**

- Bacteria spoil food  
Contamination of  
water.
- Bacteria in the  
environment

• In this section, various aspects related to spoilage of food by bacteria contamination of food etc. can be discussed through oral questions like the following.

- (i) When your mother prepares kheer for you, what are the food constituents in it Give one function of each. • Involving
  - (ii) How can we prevent food from spoiling and getting contaminated? • Inviting
  - (iii) What are the various methods of storing and preserving milk, potato and mango? • Seeking information
  - (iv) Give one example of bacteria which is useful for food? • Inquiring
  - (v) In what way can contaminated water be made safe for drinking?
  - (vi) How does the house fly disseminate various diseases?
  - (vii) Give suggestions to improve community health?
- 

## **SUMMING UP**

Since every learning unit is unique as it has different content, it requires different instructional strategies to develop the lesson. Accordingly, use of questioning as a teaching device demands different types of questions, following different sequences. However, the three major instructional stages remain the same. Attempt is made in this lesson plan to provide indications of the nature of questions vis-a-vis questioning which can be taken advantage of at different phases and stages of instruction. All these, as shown, help in motivating, involving, inquiring developing, clarifying, elaborating, attention seeking, directional, reviewing, diagnosing and making assessment. However, through this exemplar plan, an attempt has not been made to cover all possible aspects of the content or the desired learning outcomes



## CONCLUSION

Classroom questioning demands on the spot need assessment, academic acumen, imagination, and creativity to structure a question and deliver the same as and when necessary to serve the intended purpose. It requires focusing on an individual and the whole class using proper syntax, articulation, and tone. Also each question has to be formulated on the basis of pre-determined content, to develop or assess the learning outcomes. This helps to evoke in students the intended cognitive processes to have the desired instructional impact.

It is evident that guidelines for effective questioning, help improve the structure and delivery of questions. Firstly, it is important to remain cognizant of the phase of instruction during which the teacher is questioning (pre-instructional, instructional, and post-instructional), as this would help in identifying the type of question to be used under the broad categories of managerial, developmental and evaluative questions. Second, the purpose of questioning must be very clear before using a question. Are we going to use the question for the motivating, attention seeking, directing, inquiring, diagnosing or judging? Third; what would be the basis of the question which is to be asked? At what level should the question be asked? In other words, which learning outcomes are to be achieved or desired i.e. recall of information (knowledge), comprehension of information or applying previously learned material to new situations (Application).





Fourth, how to structure the question adequately in terms of its format, wording, and comprehensibility. What to avoid in a question and how to manage students' responses is equally important. Lastly, it is also very significant to ensure effective delivery and distribution of the question i.e., mode of delivery, sequencing of questions, individual or class directed and timing of questions are some of the relevant features to be taken care of during questioning.

It is also evident that questions classified under different categories of exemplars do overlap, as similar questions appear more than once under different categories. This is possible and is unavoidable since context and timing of each question varies along with its focus. A question used for giving factual information, may also be used for testing pre-requisite learning to determine readiness of students and can also be employed for diagnostic purpose. Similarly, a concept based question may be used for developing or assessing outcomes of learning at different levels under the categories of knowledge, comprehension and application based questions. Learning outcomes based questions can also be utilised for review, diagnostic and judgmental purposes. In fact, every judgmental question is diagnostic in some way. A motivational question automatically leads to attention seeking. An inquiring question is also involvemental because both demand students' active participation. Similarly, some directional questions (indicating indirectly, some procedure) are in a sense also involvemental.



The classification of content based, learning outcomes based, and pedagogy based questions is integrative, and not exclusive in terms of practice. Emphasis in content based questions should be on coverage of all content aspects from the point of view of teaching, learning and assessment. In case of questions based on learning outcomes, the underlying idea is to emphasize attainment and assessment of maximum possible instructional objectives. In case of pedagogy based questions, emphasis is on how best to create a learning environment which promotes better learning. Use of different varieties of questions help to make students more interactive, motivated, inquiring, and interested in learning. Therefore, it can be concluded that success of any question depends on how best the teacher is able to formulate and deliver quality questions for use of students during instruction to achieve the desired learning outcomes.



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## APPENDIX - I

### SCHEDULE

Purpose of this questionnaire is to collect information from teacher educators, about the use of questioning in their instructional programmes with a view to identifying the areas of strengths and weaknesses, on the basis of which resource material for teachers will be developed. You are requested to respond to all questions and if you so like do not sign after filling up.

1. Is questioning a technique or tool ? (            )
2. Are questions tools or technique? (            )
3. List two ways in which questioning can be used as a device.  
(a) \_\_\_\_\_ (b) \_\_\_\_\_
4. While teaching a lesson, when can teacher use the questioning device? (stages of instruction)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. List the various purposes for which questioning device can be used while a class.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. What do you understand by different levels of questions?  
Give one example of each, for use in teaching.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



7. Write one factual, one conceptual and one thematic question which can be used in questioning, during teaching

i. \_\_\_\_\_  
ii. \_\_\_\_\_  
iii. \_\_\_\_\_

8. Which form of questions (O.T./S.A./E/T/\*) are easy to use and handle as a questioning device?

\_\_\_\_\_

9. How quality of a question is related to cognitive demands or development of intellectual skills? Write in 2 or 3 sentences.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. Should questions be addressed to the whole class or an individual, while teaching the class? ( )

11. How questioning provides the basis for remedial work?

i. \_\_\_\_\_  
ii. \_\_\_\_\_  
iii. \_\_\_\_\_

12. How should questions be structured for use in class room.

i. \_\_\_\_\_  
ii. \_\_\_\_\_  
iii. \_\_\_\_\_

13. List specific areas, you would like to know more about for efficient questioning in class room.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- \* O.T. : Objective Type  
S.A. : Short Answer  
E.T. : Essay Type



## APPENDIX - II

### *Descriptions of the Major Categories in the Cognitive Domain of the Taxonomy of Educational Objectives (Bloom 1956)*

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**1. Knowledge.** Knowledge is defined as the remembering of previously learned material, and involves recall of material, (specific facts to complete theories). Knowledge represents the lowest level of learning outcomes in the cognitive domain.

Example :

- Name of food constituent which helps in the growth of body cells?
- 

**2. Comprehension.** Comprehension is defined as the ability to grasp the meaning of material. This may involve translating material from one form to another interpreting material (explaining or summarizing), and extrapolation. Comprehension represents the lowest level of understanding.

Example :

- Give an example of a fibrous root and a supporting root?
- 

**3. Application.** Application refers to the ability to use learned material in new and concrete situations. This includes application of rules, procedures or generalized methods, principles, ideas, theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.

Example:

- What would happen to a potted plant with green leaves if kept in a dark room?
- 

**4. Analysis.** Analysis refers to the ability to break down material into its constituent parts such that the relationship between the ideas expressed are clear. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the "explicit" and "implicit" structural form of the material.

Example:

- A man was advised to take green leafy vegetables, carrots, cod-liver oil and mangoes. What was the basis for recommending this diet? (Deficiency of Vitamin A)
- 

**5. Synthesis.** Synthesis refers to the ability to put parts together to form a whole. This may involve the production of a unique communication (speech), a plan (research proposal), or a set of abstract relations (scheme for classifying





information). Learning outcomes in this area emphasize the formulation of *new* pattern or structure.

Example :

- Plan a diet for a child showing symptoms of bleeding gums and extreme weakness?
- 

**6. Evaluation.** Evaluation is concerned with the ability to judge the value of material. Quantitative and qualitative judgements in terms of internal criteria (organisation) or external criteria. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories, plus value judgments based on a specified criteria.

Example :

- "A person suffering from sore gums and bleeding teeth is advised to take all types of citrus fruits. Because they contain Vitamin B, lack of which causes the above condition". Is this statement consistent with known facts? If not, make it consistent?
-



**APPENDIX - III**

**PROJECT : TEACHER QUESTIONING IN THE CLASSROOM-  
DEVELOPMENT OF RESOURCE MATERIAL.**

**Review Workshop Held On 22<sup>nd</sup> to 24<sup>th</sup> March'2000**

***List of Resource Persons of the Review Workshop***

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